

Jeffries, Dawn (DEQ)

From: Kirpekar, Abhay C [abhay_kirpekar@merck.com]
Sent: Friday, October 28, 2011 3:44 PM
To: Jeffries, Dawn (DEQ); Kiracofe, Brandon (DEQ)
Cc: McCloskey, John A; Buzby, Mary E.
Subject: FW: Information for VaDEQ

Dawn - Mary confirms

Abhay Kirpekar
Merck - Elkton Environmental
(540) 298-4802

From: Buzby, Mary E.
Sent: Friday, October 28, 2011 3:32 PM
To: Kirpekar, Abhay C
Cc: McCloskey, John A
Subject: RE: Information for VaDEQ

Abhay, Dawn is correct. The Elkton plant was one of the two direct discharging facilities. Mary

From: Kirpekar, Abhay C
Sent: Friday, October 28, 2011 3:06 PM
To: Jeffries, Dawn (DEQ)
Cc: McCloskey, John A; Buzby, Mary E.
Subject: RE: Information for VaDEQ

Dawn - Thanks for your prompt reply.

Abhay Kirpekar
Merck - Elkton Environmental
(540) 298-4802

From: Jeffries, Dawn (DEQ) [mailto:Dawn.Jeffries@deq.virginia.gov]
Sent: Friday, October 28, 2011 2:55 PM
To: Kirpekar, Abhay C
Subject: RE: Information for VaDEQ

Abhay,

I thank you and Mary; this is very helpful. I will document it in the fact sheet so we don't need to have the same conversation again in five years.

If I recall from the teleconference earlier this week, this facility was one of the two direct discharging facilities (Subcategory D) that did discharge organic pollutants, correct?

If so, I will change the fact sheet and permit to reflect the calculations as they were previously done for these pollutants. I will have it to you in a few days.

Dawn

From: Kirpekar, Abhay C [mailto:abhay_kirpekar@merck.com]
Sent: Friday, October 28, 2011 2:40 PM
To: Jeffries, Dawn (DEQ); Kiracofe, Brandon (DEQ)
Cc: McCloskey, John A; Buzby, Mary E.
Subject: FW: Information for VaDEQ

Dawn - Please find response from Dr. Mary Buzby.
Thanks.

Abhay Kirpekar
Merck - Elkton Environmental
(540) 298-4802

From: Buzby, Mary E.
Sent: Friday, October 28, 2011 2:17 PM
To: Kirpekar, Abhay C; McCloskey, John A
Subject: RE: Information for VaDEQ

Abhay, Sorry for the late reply, was in DC yesterday. Give me a call if you have any questions. Mary

Hello, Dawn. I looked in the Development Document (DD) for the response to your questions. In the DD EPA discusses why only 5 organic constituents were regulated for B and D subcategories under the pretreatment standards for indirect dischargers.

"For PSES for Subcategories B and D, EPA has selected the second option (organics only and withdraw cyanide). EPA is basing this selection on the fact that the five pollutants regulated under this option have been determined to pass through, and the pollutant removals are high with respect to the compliance costs." EPA Pharmaceutical Development Document, EPA 821-R-98-005, page 11-8

The agency determined that most of the pollutants evaluated during the rule-making will be adequately treated at POTWs and do not pass-through POTWs based on the EPA's definitions. Only 5 constituents needed to be regulated to protect against pass-through.

EPA did not publish any BAT limits for the B/D direct discharging plants. This is their explanation, again from the DD.

" EPA has evaluated the discharge loadings of organic pollutants from Subcategory B and D facilities and has determined that 95 percent of the discharge of organic pollutants is from two

facilities. Most direct discharging Subcategory B and D facilities do not discharge any organic pollutants. EPA believes these organic pollutant discharges are not sufficient to justify national regulations for these subcategories. If permit writers determine the need to further control the organic pollutants from the two facilities, the appropriate limits contained in the Subcategory A and C BAT regulations may be used." EPA Pharmaceutical Development Document, EPA 821-R-98-005, page 11-5

Hope this is helpful. Again, don't hesitate to call with other questions. Mary

Mary Buzby
Global Safety & the Environment
Merck & Co., Inc
PO Box 200, WS2W14
Whitehouse Station, NJ 08889
908-423-7837

From: Kirpekar, Abhay C
Sent: Thursday, October 27, 2011 11:49 AM
To: Buzby, Mary E.; McCloskey, John A
Subject: FW: Information for VaDEQ

Mary - Can you please answer this question.

Abhay Kirpekar
Merck - Elkton Environmental
(540) 298-4802

From: Jeffries, Dawn (DEQ) [mailto:Dawn.Jeffries@deq.virginia.gov]
Sent: Thursday, October 27, 2011 11:43 AM
To: Kirpekar, Abhay C
Cc: Kiracofe, Brandon (DEQ)
Subject: RE: Information for VaDEQ

Thanks Abhay,

This information is helpful and seems to provide justification for use of 1.2 MGD as the flow for calculating mass limits as you request.

Since Subpart D is not regulated for these parameters for direct dischargers, I must also establish what concentrations to use in the calculations. Your request implies using the same concentrations as are stipulated for BAT for Subparts A & C. This seems reasonable since chemicals that were regulated for Subpart D were regulated at levels identical to those in Subparts A & C. However, it does raise the question as to why some, but not all, of the regulated organic chemicals in Subparts A & C are applied to subpart D? Can you or Mary Buzby provide further justification on this point?

Sincerely,

Dawn

Dawn Jeffries
Environmental Engineer
DEQ-Valley Regional Office
P.O. Box 3000
Harrisonburg, Virginia 22801
Ph. 540-574-7898
Dawn.Jeffries@deq.virginia.gov

From: Kirpekar, Abhay C [mailto:abhay_kirpekar@merck.com]
Sent: Wednesday, October 26, 2011 1:10 PM
To: Jeffries, Dawn (DEQ); Kiracofe, Brandon (DEQ)
Cc: McCloskey, John A; Bryant, Peggy A; Buzby, Mary E.
Subject: FW: Information for VaDEQ

Dear Dawn and Brandon,

Thanks for participating in an impromptu teleconference with us yesterday.

Summary of our conversation is:

- 1) deletion of the testing requirement for tributyltin and inclusion of Diazinon testing in the VPDES permit; and
- 2) request for reconsideration of including subpart D flow in the calculation of mass limits for effluent guideline compounds listed on page 17, Appendix C of the Merck VPDES permit VA0002178 fact sheets.

Documentation supporting Merck's request is given below in the e-mail by Dr. Mary Buzby.

Please let me know if you have any questions or comments.

Thanking you for your support.

Sincerely,

Abhay Kirpekar
Merck - Elkton Environmental
(540) 298-4802

y, Mary E.
ay, October 25, 2011 8:11 PM
r, Abhay C; McCloskey, John A
Randall W.
Information for VaDEQ

Please forward.

Dear Dawn and Brandon,

Attached are some pages from the EPA Response to Comments Document that discuss how the pharmaceutical effluent guidelines were developed and the role that Merck's Elkton, Virginia plant played in that rulemaking. I do not believe that this document was ever published electronically, it is in the docket for the rule making. I'll be happy to send you a complete copy, which is very large, if you are interested.

In response to this comment, EPA identified the "best plants" that were used as the basis of the rulemaking and described the criteria for qualifying pharmaceutical manufacturing facilities as a "best plant". The Elkton plant was coded

30540 during rule development, EPA clearly identified the plant as generating wastewater regulated in categories A, C and D. However, the data provided by the plant was used exclusively for development of BPT and BAT limitations for categories A and C. As you can see there was only one plant that was a direct discharger and category D exclusively that met EPA criteria for inclusion in the rulemaking as BAT. This limited data set precluded EPA from establishing BAT limits for direct discharging B and D plants.

(As a point of interest, Plant 30010 was Merck's plant in Flint River, Georgia a strictly chemical production plant that is not longer in operation and Plant 30623 is our plant in Danville, Pennsylvania that continues to manufacture active pharmaceutical ingredients by fermentation and chemical processes.)

In this comment, EPA responded to a similar question related to dilution in the calculation of BPT limits. Here the agency describes process wastewater to includes all pharmaceutical manufacturing wastewater and clearly allows for up to 25% dilution water from sources other than process wastewater for calculation of both BAT and BPT permit limits. Merck's application indicates that the current ratio of total process wastewater to total wastewater flow is 83%. That is about the same ratio that existed when the rule was developed and Merck expects that ratio will continue into the future to be less than 25% dilution because the only sources of water that are not process water are sanitary and some limited utility flows.

Finally, this response to comments discussed the flow that can be used as the basis of the permit limits to implement the pharmaceutical effluent guidelines. EPA indicates the permit writer has flexibility to account for flow fluctuations. In the case of Elkton, it is completely reasonable to anticipate that the monthly average flow at the plant will be at the design capacity of the treatment plant during the tenure of this permit. The decision to calculate monthly average permit limits for effluent guidelines constituents on the plant design flow rather than annual average flow is aligned with EPA guidance and reflects the level of variability that is expected in the plant wastewater flow.

Based on these three documents that describe the history of the regulatory development, the inclusion of Category D wastewater at Elkton with Category A and C wastewater during rule development and the total process flow being 83% of the total flow indicating less than 25% dilution, we are requesting that the total design flow be the basis for the calculation of all effluent guidelines limitations.

Please call me if you would like to discuss this further or would like more information from Merck or from the docket. Many thanks for considering this request.

Mary Buzby
908-423-7837

PS:
This is the title page to the Response to Comments Document for your records.

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DCN 8289
SECTION 12.5

Comment Response Document
for Effluent Limitations Guidelines and Standards
for the Pharmaceutical Manufacturing
Point Source Category

U.S. Environmental Protection Agency
Office of Water
Engineering and Analysis Division
401 M Street, S.W.
Washington, D.C. 20460

July 30, 1998

VI. BPT

BPTCRI B. "Best Plants" Criteria

2 comments: PhRMA, Merck & Co., Inc.

- a. EPA has not adequately documented how it selected the "best plants" for development of the proposed BPT effluent limitations guidelines. PhRMA does not have a fundamental problem with EPA's BPT plant selection criteria. However, the criteria exclude a number of direct discharge plants from the BPT data base and it would have been helpful if the Agency had shown the influent, effluent, and treatment system data for all direct discharge plants. PhRMA is concerned that because of the great diversity of wastewater characteristics in this industry, especially in the A/C subcategory, 5 plants may not represent a sufficiently large segment of the universe of 23 direct discharge A/C plants to assure that the variability in raw waste loadings and treatability has been adequately captured by the proposed BPT plants. For example, at least one of these plants, plant 50007, manufactures only four products in two major production lines. Furthermore, 98.3% of the pharmaceutical process water is generated in one of the production lines that includes continuous (as opposed to batch) processes. This plant happens to be one of the two BPT plants that achieves very low effluent BOD and TSS concentrations (Table 4, SSD). Plant 50005 manufactures 8 products and 7 intermediates and achieves a long-term average BOD that is 3 times greater than that achieved by plant 50007. All of the manufacturing processes at plant 50005 are batch processes. This difference in achievable effluent quality is not a coincidence; plants that manufacture multiple products and intermediates and use batch processes are going to have more variable waste loads than plants that manufacture a few products and use continuous processes. EPA should provide, for review, information on all of the pharmaceutical plants that achieve 90% BOD removal and 74% COD removal on a consistent basis. Data on number of products and intermediates manufactured and the fraction of production from batch processes should be provided.

The criteria for best performers is that: 1) the system consistently surpasses, on a long-term basis, 90% BOD₅ reduction and 74% COD reduction in pharmaceutical manufacturing wastewater, as required by the existing BPT effluent limitations guidelines (40 CFR Part 439); 2) the treatment system represented by the data treat 50% or more by volume of pharmaceutical process wastewater in relation to other process wastewater treated by the system; and 3) can not contain greater than 25% nonprocess wastewater through the treatment system. Four facilities pass these criteria for best performers. The following table shows these best performer facilities, the

subcategories in which they operate, and the number of products produced at these facilities in 1990.

Facility	Subcategory	No. of Products
30010	C	20
30540	A, C, D	14
30623	A, C	18
30637	D	51

Influent and effluent treatment performance data for these four facilities, along with data for all facilities which met the first two criteria outlined above, are included in a database with the August 8, 1997 NOA, which EPA provided in the public record.

- b. *EPA has not clearly demonstrated how the best practical control technology limits were developed for this industry. In the preamble to this proposed rule (Section ix (e.) (l.), EPA states that they usually develop editing criteria, however, the agency concluded that no such editing criteria was necessary for this rule because the performance data for the advanced biological treatment systems were similar. Five plants emerged as best performers for A/C and two for B/D categories. However, the actual number of plants which currently meet BPT levels is not discussed. In Table 4 of the statistical support document, EPA lists data from fourteen plants which were considered to develop the BPT limits. However, of those 14, only seven plants were chosen as BPT plants. EPA has not provided any explanation of why those plants were chosen from among the rest.*

At proposal, the facilities in question did represent best performing facilities, but the data from the facilities which were not used did not represent advanced biological treatment. These facilities had wastewater treatment technologies either in addition to or fundamentally different than advanced biological treatment.

In the final regulation only facilities with data representative of the selected treatment option, advanced biological treatment, have been evaluated as best performers. See response to issue (a) above. The Statistical Support Document located in the final record documents the calculation of the BPT limitations for COD.

IV. Nonprocess WW in Calculations

NONWW1 A. BPT Calculations

9 comments: *Eli Lilly and Co., Hoffmann-La Roche (Nutley, NJ), PhRMA, Merck & Co., Inc. (Whitehouse Station, NJ).*

- a. *EPA's calculation of the proposed BPT Limitations and engineering cost estimates for BOD, COD, and TSS failed to account for the volume of non-process wastewaters in the effluents, causing the cost and effect of the proposed limits to be understated. (e.g., No TSS allowance is given for noncontact cooling water and sanitary water, which may make up over 50% of the effluent flow at a particular facility.)*

EPA agrees with the commenter that effluent data from facilities with large amounts of non-process water present through the treatment system and in the effluent of the facility represent diluted effluent concentrations. EPA has therefore modified its approach for the calculation of BPT and BAT limitations from that used at proposal. EPA has used data from only those facilities meeting the following best performer criteria: 1) the system consistently surpasses, on a long-term basis, 90% BOD₅ reduction and 74% COD reduction in pharmaceutical manufacturing wastewater, as required by the existing BPT effluent limitations guidelines; 2) the treatment system represented by the data treat a major portion (49% or more by volume) of pharmaceutical process wastewater in relation to other process wastewater treated by the system; and 3) the treatment system does not contain greater than 25% nonprocess wastewater through the treatment system. The third criteria addresses the issue of dilution water in the data and is the same approach used and in the promulgated Organic Chemicals, Plastics, and Synthetic Fibers (OCPSF) regulation (52 FR 42522).

Process water includes pharmaceutical manufacturing wastewater, air pollution control, or other wastewater which would contribute organic pollutant loads. Dilution water includes non-contact cooling water, non-contact ancillary use water, sanitary wastewater, storm water, and other water not related to process operations.

Therefore, in the development of the final BPT regulations, the Agency has removed from consideration facilities containing greater than 25% nonprocess wastewater through the biological treatment system. In addition, one facility which has less than 25% nonprocess wastewater through the biological treatment system but the end-of-pipe conventional data include a high flow of dilution water added to the treated facility flow prior to the effluent sample point, had its effluent data corrected for the dilution after treatment. The resulting limitations for BPT are to be applied to the process wastewater flow of a facility allowing for up to but not more than 25% nonprocess wastewater volume through the end-of-pipe treatment.

III. WW Characteristics

D. Stream Profiles

WWSTRM4. 4. Flow Variability

I comment: Abbott Labs

- a. *Computing mass-based limits on annual average flow poses an unreasonable hardship on treatment facilities with a widely fluctuating daily flow. For example, in a facility where ammonia containing process wastewater flow varies widely from day to day, use of annual average flow would result in unreasonably stringent mass limits in the permit.*

The final rule does not require a mass-based limit to be determined using a specific method to calculate discharge flow. In calculating mass-based limits control authorities have sufficient flexibility to account for widely fluctuating daily flow.

Jeffries, Dawn (DEQ)

From: Jeffries, Dawn (DEQ)
Sent: Friday, October 21, 2011 3:37 PM
To: 'Kirpekar, Abhay C'
Subject: Revised Merck Permit and Fact Sheet
Attachments: 102111 FS.pdf, 102111 DP.pdf

Abhay,

I have revised the documents based on your comments.

Also, I discussed your request regarding the use of Subpart D flow in mass calculations with Brandon. He told me that with the regulation as it is written, we cannot use that flow in the calculations.

Shall I send it to public notice?

Sincerely,
Dawn Jeffries
Environmental Engineer
DEQ-Valley Regional Office
P.O. Box 3000
Harrisonburg, Virginia 22801
Ph. 540-574-7898
Dawn.Jeffries@deq.virginia.gov

Jeffries, Dawn (DEQ)

From: Jeffries, Dawn (DEQ)
Sent: Wednesday, October 19, 2011 11:32 AM
To: 'Kirpekar, Abhay C'
Subject: RE: Draft Permit & Fact Sheet for VA0002178

Abhay,

Thanks for your quick response.

Regarding the flow used to calculate the mass limits for parameters at outfall 101, I used non-process wastewater flow and process wastewater flows for Subparts A & C, as allowed. The regulations apply limitation guidelines for those parameters to Subparts A and C only (page 7-2 of the guidance document). Therefore, subpart D wastewater flow of 0.13 MGD is not included in the calculations for these parameters. 1.2 MGD - 0.13 MGD. That is why I used 1.07 MGD. I see no way that I can justify using the 1.2 MGD flow.

Sincerely,
Dawn

-----Original Message-----

From: Kirpekar, Abhay C [mailto:abhay_kirpekar@merck.com]
Sent: Tuesday, October 18, 2011 1:46 PM
To: Jeffries, Dawn (DEQ); Kiracofe, Brandon (DEQ)
Cc: Bryant, Peggy A; McCloskey, John A
Subject: RE: Draft Permit & Fact Sheet for VA0002178

Dear Ms. Jeffries - Thanks a lot for promptly e-mailing the draft documents.

We understand that EPA pharmaceutical effluent guidelines were formulated using wastewater data from pharmaceutical plants that included up to 25% of non-process wastewater.

The FR is attached (refer to sections IV and VIII).

<http://www.gpo.gov/fdsys/pkg/FR-1998-09-21/pdf/98-21027.pdf>

Furthermore, EPA guidance for permit writers is to allow calculation of mass discharge limits from pharma manufacturing plants to include all wastewater containing up to 25% dilution water, i.e., water that is not subject to the regulations.

Please see attached Permit Writer's Guide, Section 8.2.1.

Our non process wastewater is only 17%. Please see attached communication to you, dated August 8th, 2011.

We request that 1.2 MGD be used instead of the 1.07 MGD for the mass limit calculation of the effluent guideline compounds.

Please let me know if you have any questions or comments.

Thanks.

Sincerely

Abhay Kirpekar
Merck - Elkton Environmental
(540) 298-4802

From: Jeffries, Dawn (DEQ) [<mailto:Dawn.Jeffries@deq.virginia.gov>]
Sent: Thursday, October 06, 2011 2:32 PM
To: McCloskey, John A
Cc: Kirpekar, Abhay C; Kiracofe, Brandon (DEQ)
Subject: Draft Permit & Fact Sheet for VA0002178

Mr. McCloskey,

As we discussed, here are the permit renewal draft documents for your review. The results from the recent toxicity test were included and did not trigger a limit. Also, I am assuming that the modified stream model will not necessitate changes.

Sincerely,

Dawn Jeffries
Environmental Engineer
DEQ-Valley Regional Office
P.O. Box 3000
Harrisonburg, Virginia 22801
Ph. 540-574-7898
Dawn.Jeffries@deq.virginia.gov

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Merck
Merck Sharp & Dohme Corp.
2778 South Eastside Hwy
Elkton, VA 22827
T 540 298 1211
merck.com

October 20, 2011

RECEIVED
D70 - Valley
OCT 24 2011
To: _____
FILE: _____



Dawn Jeffries
Environmental Engineer
DEQ-Valley Regional Office
4411 Early Road
Harrisonburg, Virginia 22801

RE: Comments on Merck VPDES Draft Permit VA0002178 and Fact Sheet

Dear Ms. Jeffries,

Please find copies of the draft permit and fact sheet with Merck comments. A summary of the comments, followed by request for reconsideration of the inclusion of subpart D flow in the effluent guideline mass limits, is given below.

1) Draft Permit Comments

Summary of Comments on PERMIT Merck 2012-VPDES.docx

Page: 1

[+] Author: kirpekar Subject: Inserted Text Date: 10/20/2011 9:33:57 AM
, Inc.

Page: 2

[+] Author: kirpekar Subject: Cross-Out Date: 10/20/2011 1:39:55 PM

[+] Author: kirpekar Subject: Inserted Text Date: 10/20/2011 1:40:29 PM
(only footnote "c" applicable to TSS)

[+] Author: kirpekar Subject: Cross-Out Date: 10/20/2011 1:40:31 PM

[+] Author: kirpekar Subject: Cross-Out Date: 10/20/2011 1:40:39 PM

[+] Author: kirpekar Subject: Inserted Text Date: 10/20/2011 1:40:35 PM
E

[+] Author: kirpekar Subject: Inserted Text Date: 10/20/2011 1:40:42 PM
E

Page: 5

<input checked="" type="checkbox"/>	Author: kirpekar	Subject: Cross-Out	Date: 10/20/2011 9:36:29 AM
<input checked="" type="checkbox"/>	Author: kirpekar	Subject: Inserted Text	Date: 10/20/2011 9:42:38 AM

5 (request 5 day interval, to account for weather related sample delivery schedule changes to an off-site VELAP certified testing lab)

Page: 6

<input checked="" type="checkbox"/>	Author: kirpekar	Subject: Cross-Out	Date: 10/20/2011 9:43:26 AM
<input checked="" type="checkbox"/>	Author: kirpekar	Subject: Inserted Text	Date: 10/20/2011 9:52:57 AM

5 (Per Standard Method Edition 18, SM5210B, the limit of detection of BOD is 2 mg/L. The limit of quantitation (LOQ) as determined in our wastewater analysis lab is 5 mg/L. We request that we be allowed to use the LOQ as the QL for reporting purposes)

Page: 7

<input checked="" type="checkbox"/>	Author: kirpekar	Subject: Cross-Out	Date: 10/20/2011 10:00:10 AM
<input checked="" type="checkbox"/>	Author: kirpekar	Subject: Inserted Text	Date: 10/20/2011 10:00:24 AM

(typo?)

Page: 8

<input checked="" type="checkbox"/>	Author: kirpekar	Subject: Cross-Out	Date: 10/20/2011 10:06:19 AM
<input checked="" type="checkbox"/>	Author: kirpekar	Subject: Inserted Text	Date: 10/20/2011 10:10:49 AM

started within 30 days of the original sample (Comment - this condition gives greater flexibility to carry out sampling in the w case - when the operations have returned to full capacity after the summer shut down)

2) Fact sheet Comments

Summary of Comments on Fact Sheet 2012.docx

Page: 2

 Author: kirpekar Subject: Cross-Out Date: 10/20/2011 1:31:20 PM

 Author: kirpekar Subject: Inserted Text Date: 10/20/2011 1:32:05 PM
150 (Appendix A score = 40+50+40+10+10= 150)

Page: 7

 Author: kirpekar Subject: Cross-Out Date: 10/20/2011 1:10:17 PM

 Author: kirpekar Subject: Inserted Text Date: 10/20/2011 1:10:11 PM
Sharp & Dohme Corp.

Page: 16

 Author: kirpekar Subject: Inserted Text Date: 10/20/2011 1:13:32 PM
(electronic and/or paper)

Page: 34

 Author: kirpekar Subject: Cross-Out Date: 10/20/2011 1:23:26 PM

 Author: kirpekar Subject: Inserted Text Date: 10/20/2011 1:23:27 PM
1

 Author: kirpekar Subject: Cross-Out Date: 10/20/2011 1:23:34 PM

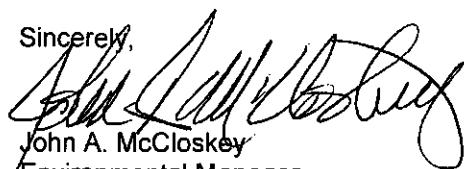
 Author: kirpekar Subject: Inserted Text Date: 10/20/2011 1:23:35 PM
1

Also please note that the subpart D flow (0.13 MGD) at Merck's site results from formulating, mixing, tabletting and sterile filling of active pharmaceutical ingredients and incipient. The waste water generated from this activity contains treatable organic and inorganic chemicals that are non-hazardous. This waste water co-mingles with the rest of our waste water prior to reaching the waste water treatment plant. We therefore request that the subpart D flow be included in the calculation of mass loading for the effluent guideline compounds.

Please let me or Abhay Kirpekar (540-298-4802) if you have any comments or questions.

Thanks.

Sincerely,



John A. McCloskey
Environmental Manager
Merck Sharp & Dohme Corp. - Elkton Plant
(540) 298-4122



COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Permit No. VA0002178

Effective Date: January 1, 2012
Expiration Date: December 31, 2016

AUTHORIZATION TO DISCHARGE UNDER THE
VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM
AND
THE VIRGINIA STATE WATER CONTROL LAW

In compliance with the provisions of the Clean Water Act as amended and pursuant to the State Water Control Law and regulations adopted pursuant thereto, the following owner is authorized to discharge in accordance with the information submitted with the permit application, and with this permit cover page, Part I - Effluent Limitations and Monitoring Requirements, and Part II - Conditions Applicable To All VPDES Permits, as set forth herein.

Owner: Merck Sharp & Dohme Corp., a Division of Merck & Co.
Facility Name: Merck Sharp & Dohme Corp. - Stonewall Plant
County: Rockingham
Facility Location: 2778 South East Side Highway, Elkton

The owner is authorized to discharge to the following receiving stream:

Stream: South Fork Shenandoah River
River Basin: Potomac
River Subbasin: Shenandoah
Section: 3
Class: IV
Special Standards: pH

Amy T. Owens, Regional Director
Valley Regional Office

Date

Summary of Comments on PERMIT Merck 2012-VPDES.docx

Page: 1

Author: kipeker Subject: Inserted Text Date: 10/29/2011 9:35:57 AM
Inc.

Page: 2

<input checked="" type="checkbox"/> Author: kipeter	Subject: Cross-Out	Date: 10/20/2011 1:39:55 PM
<input checked="" type="checkbox"/> Author: kipeter	Subject: Inserted Text	Date: 10/20/2011 1:40:29 PM (only footnote "C" applicable to TSS)
<input checked="" type="checkbox"/> Author: kipeter	Subject: Cross-Out	Date: 10/20/2011 1:40:31 PM
<input checked="" type="checkbox"/> Author: kipeter	Subject: Cross-Out	Date: 10/20/2011 1:40:32 PM
<input checked="" type="checkbox"/> Author: kipeter	Subject: Inserted Text	Date: 10/20/2011 1:40:35 PM E
<input checked="" type="checkbox"/> Author: kipeter	Subject: Inserted Text	Date: 10/20/2011 1:40:42 PM E

Permit No. VAA000144																																																																																											
Part I																																																																																											
Page 1 of 26																																																																																											
<p>A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS</p> <p>1. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from Duct 1001 (combined plant) final effluent includes: internal offfall [10]; non-contact cooling water; and term 3A-1.</p> <p>This discharge shall be limited and monitored as specified below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: left; padding-bottom: 5px;">EFFLUENT CHARACTERISTICS</th> <th colspan="3" style="text-align: center; padding-bottom: 5px;">DISCHARGE LIMITATIONS</th> <th colspan="2" style="text-align: left; padding-bottom: 5px;">MONITORING REQUIREMENTS</th> </tr> <tr> <th style="text-align: left; width: 20%;">Monthly Average</th> <th style="text-align: left; width: 20%;">Weekly Average</th> <th style="text-align: left; width: 20%;">Minimum</th> <th style="text-align: left; width: 20%;">Maximum</th> <th style="text-align: left; width: 20%;">Frequency</th> <th style="text-align: left; width: 20%;">Sample Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Flow (MGD)*</td> <td style="text-align: left;">NL</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NL</td> <td style="text-align: left;">Continuous</td> <td style="text-align: left;">TIRE</td> </tr> <tr> <td style="text-align: left;">pH (standard units)*</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">6.5</td> <td style="text-align: left;">9.0</td> <td style="text-align: left;">Continuous</td> <td style="text-align: left;">Recorded</td> </tr> <tr> <td style="text-align: left;">BOD₅ (kg/d)^b</td> <td style="text-align: left;">NL (mg/L)</td> <td style="text-align: left;">NL (kg/d)</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NL (mg/L)</td> <td style="text-align: left;">1/Month</td> <td style="text-align: left;">24 HC</td> </tr> <tr> <td style="text-align: left;">Suspended Solids^c</td> <td style="text-align: left;">NL (mg/L)</td> <td style="text-align: left;">NL (kg/d)</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NL (mg/L)</td> <td style="text-align: left;">1/Month</td> <td style="text-align: left;">24 HC</td> </tr> <tr> <td style="text-align: left;">Total Residual Chlorine (TRC)(mg/L)^d</td> <td style="text-align: left;">0.097</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">0.19</td> <td style="text-align: left;">1/Day</td> <td style="text-align: left;">Onsite</td> </tr> <tr> <td style="text-align: left;">Dissolved Oxygen (mg/L)</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">4.5</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">1/Day</td> <td style="text-align: left;">Onsite</td> </tr> <tr> <td style="text-align: left;">Chemical Oxygen Demand*</td> <td style="text-align: left;">NL (mg/L)</td> <td style="text-align: left;">NL (kg/d)</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NL (mg/L)</td> <td style="text-align: left;">1/Month</td> <td style="text-align: left;">24 HC</td> </tr> <tr> <td style="text-align: left;">Total Cyanide^e</td> <td style="text-align: left;">2.54 mg/L</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">0.26 mg/L</td> <td style="text-align: left;">1/Week</td> <td style="text-align: left;">Onsite</td> </tr> <tr> <td style="text-align: left;">Ammonium-N^f</td> <td style="text-align: left;">NL (mg/L)</td> <td style="text-align: left;">NL (kg/d)</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NL (mg/L)</td> <td style="text-align: left;">1/Month</td> <td style="text-align: left;">24 HC</td> </tr> <tr> <td style="text-align: left;">Total Kjeldahl Nitrogen (or N₂O(g/d))^g</td> <td style="text-align: left;">129</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">3600</td> <td style="text-align: left;">1/Month</td> <td style="text-align: left;">24 HC</td> </tr> <tr> <td style="text-align: left;">Temperature (°C)*</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">NA</td> <td style="text-align: left;">37</td> <td style="text-align: left;">Continuous</td> <td style="text-align: left;">Recorded</td> </tr> </tbody> </table>			EFFLUENT CHARACTERISTICS		DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type	Flow (MGD)*	NL	NA	NL	Continuous	TIRE	pH (standard units)*	NA	NA	6.5	9.0	Continuous	Recorded	BOD ₅ (kg/d) ^b	NL (mg/L)	NL (kg/d)	NA	NL (mg/L)	1/Month	24 HC	Suspended Solids ^c	NL (mg/L)	NL (kg/d)	NA	NL (mg/L)	1/Month	24 HC	Total Residual Chlorine (TRC)(mg/L) ^d	0.097	NA	NA	0.19	1/Day	Onsite	Dissolved Oxygen (mg/L)	NA	NA	4.5	NA	1/Day	Onsite	Chemical Oxygen Demand*	NL (mg/L)	NL (kg/d)	NA	NL (mg/L)	1/Month	24 HC	Total Cyanide ^e	2.54 mg/L	NA	NA	0.26 mg/L	1/Week	Onsite	Ammonium-N ^f	NL (mg/L)	NL (kg/d)	NA	NL (mg/L)	1/Month	24 HC	Total Kjeldahl Nitrogen (or N ₂ O(g/d)) ^g	129	NA	NA	3600	1/Month	24 HC	Temperature (°C)*	NA	NA	NA	37	Continuous	Recorded
EFFLUENT CHARACTERISTICS		DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS																																																																																						
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<small>* NL = No Limitation, no monitoring required NA = Not Applicable TIRE = Totalizing, Indicating, and Recording Equipment 24 HC = 24-Hour Components</small>																																																																																											
<small>a. The calculated flow of effluent has been determined to be 10.86 MGD (See Fact Sheet, Introduction - Page 4 for additional information). b. See Part I.B.6 and Part I.B.7 for additional instructions regarding these parameters. c. See Part I.C. for additional monitoring and reporting instructions. d. There shall be no discharge of floating solids or visible foam in either than trace amounts.</small>																																																																																											

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EFFLUENT CHARACTERISTICS		DISCHARGE LIMITATIONS ^a			MONITORING REQUIREMENTS	
	Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD) ^b	NL	N/A	N/A	NL	Continuous	TIRE
BOD _x (kg/d) ^b	990	N/A	N/A	2700	1/Week	24 HR
Suspended Solids (kg/d) ^b	1700	N/A	N/A	3400	1/Week	24 HR
Chemical Oxygen Demand (kg/d) ^b	3400	N/A	N/A	6600	1/Week	24 HR
Ammonia-N (kg/d) ^b	120	N/A	N/A	340	1/Week	24 HR
Acetone (kg/d) ^b	0.81	N/A	N/A	2.9	1/6 Month	Composite
4-Methyl-2-pentanone (MIBK) (kg/d) ^b	0.81	N/A	N/A	2.9	1/6 Month	Composite
Isobutyraldehyde (kg/d) ^b	2.0	N/A	N/A	4.9	1/6 Month	Composite
n-Amyl acetate (kg/d) ^b	2.0	N/A	N/A	5.3	1/6 Month	Composite
n-Hexyl acetate (kg/d) ^b	2.0	N/A	N/A	5.3	1/6 Month	Composite
Ethyl acetate (kg/d) ^b	2.0	N/A	N/A	5.3	1/6 Month	Composite
Isopropyl acetate (kg/d) ^b	2.0	N/A	N/A	5.3	1/6 Month	Composite
Methyl formate (kg/d) ^b	2.0	N/A	N/A	5.3	1/6 Month	Composite
Amyl alcohol (kg/d) ^b	17	N/A	N/A	40	1/6 Month	Composite
Ethanol (kg/d) ^b	17	N/A	N/A	40	1/6 Month	Composite
Isononanol (kg/d) ^b	6.5	N/A	N/A	16	1/6 Months	Composite
Metanol (kg/d) ^b	17	N/A	N/A	40	1/6 Month	Composite
Methyl Cellulose (kg/d) ^b	169	N/A	N/A	498	1/6 Month	Composite
Phenol (kg/d) ^{b, c}	0.021	N/A	N/A	0.20	1/6 Month	Composite
Dimethyl Sulfoxide (kg/d) ^b	150	N/A	N/A	370	1/6 Month	Composite
Trichloroamine (kg/d) ^b	410	N/A	N/A	1000	1/6 Month	Composite
n-Lexane (kg/d) ^b	0.021	N/A	N/A	0.12	1/6 Month	Composite
n-Pentane (kg/d) ^b	0.021	N/A	N/A	0.20	1/6 Month	Composite
Tetrahydrofuran (kg/d) ^b	11	N/A	N/A	24	1/6 Month	Composite
Isopropyl ether (kg/d) ^b	11	N/A	N/A	24	1/6 Month	Composite
Diethylamine (kg/d) ^b	410	N/A	N/A	1000	1/6 Month	Composite

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Permit No. VAG002178 Part I Page 3 of 20						
A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS						
2. (Continued)						
EFFLUENT CHARACTERISTICS		DISCHARGE LIMITATIONS ^a			MONITORING REQUIREMENTS	
	Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Methylene chloride (kg/d) ^b	1.2	NA	NA	5.6	16 Months	Composite
Acetone (kg/d) ^c	41	NA	NA	160	16 Months	Composite
Benzene (kg/d) ^{d,e}	0.011	NA	NA	0.20	16 Months	Composite
Toluene (kg/d) ^{d,e}	0.041	NA	NA	0.74	16 Months	Composite
Chloroform (kg/d) ^{d,e}	0.033	NA	NA	0.31	16 Months	Composite
1,2-Dichloroethane (kg/d) ^{d,e}	0.40	NA	NA	1.6	16 Months	Composite
Chlorobenzene (kg/d) ^f	0.24	NA	NA	0.61	16 Months	Composite
α -Dichlorobiphenyl (kg/d) ^{d,e}	0.24	NA	NA	0.61	16 Months	Composite
Xylenes (kg/d) ^g	0.048	NA	NA	0.12	16 Months	Composite

NA = No Limitation, monitoring required. NA = Not Applicable. TIRE = Totalizing, Indicating, and Recording Equipment. 16 HC = 24-Hour Composite.

16 Months = Semiannual sampling with the results submitted with the DMR due January 10th and July 10th of each year.

a. The average design flow of this treatment facility is 1.2 MGD and peak design flow is 2.1 MGD. See Part I.E.1, for additional requirements related to facility flows.

b. See Part I.C. for additional monitoring and reporting instructions.

c. All samples must be collected in accordance with EPA procedures.

d. These parameters shall be sampled or specified in the facility's O&M Manual. The samples must then be composited for analysis as per EPA procedure.

e. This facility has Total Nitrogen and Total Phosphorus calendar year load limits associated with this outfall included in the current Registration List under registration number VASN010097, enforceable under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Tracking in the Chesapeake Watershed in Virginia.

[REDACTED] Author: kipsakar Subject: Cross-Out Date: 10/20/2011 9:36:10 AM

[REDACTED] Author: kipsakar Subject: Inserted Text Date: 10/20/2011 9:42:38 AM

S (request 5 day interval), to account for weather related sample delivery schedule changes to an off-site VELAP certified testing lab)

Permit No. A0902178 Part I Page 4 of 20						
A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS						
3. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from Outfall 102 (final discharge from the sewage treatment plant prior to discharge in the wastewater treatment plant served by Outfall 081).						
This discharge shall be limited and monitored as specified below:						
EFFLUENT CHARACTERISTICS		DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	Monthly Average	Weekly Average	Anticipated	Maximum	Frequency	Sample Type
Flow (MGD)*	NL	NA	NA	NL	Continuous	TIRE
E. coli (N/100 mL)*	125	NA	NA	NA	45/Month	Grab
NL = No Limitation monitoring required NA = Not Applicable 45/Month = 4 samples taken during the calendar month, no less than 3 days apart						
a. The design flow of this treatment facility is 0.150 MGD. See Part I.E.1. for additional requirements related to facility flows. b. See Part I.B. for additional instructions.						
A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS						
4. During the period beginning with the permit's effective date and lasting until the permit's expiration date, the permittee is authorized to discharge from Outfall 002 (storm water runoff from closed sanitary landfill).						
This discharge shall be limited and monitored as specified below:						
THERE SHALL BE NO DISCHARGE OF PROCESS WASTEWATER FROM THIS OUTFALL.						
e. There shall be no discharge of floating solids or visible foam in other than trace amounts.						

[REDACTED] Author: kirkpekar Subject: Cross-Cut Date: 10/20/2011 9:43:26 AM

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\$ (Per Standard Method Edition 16, SM2510B, the limit of detection of BOD is 2 mg/L. The limit of quantitation (LOQ) as determined in our wastewater analysis lab is 5 mg/L.)

We request that we be allowed to use the LOQ as the QL for reporting purposes.

B. ADDITIONAL TRC LIMITATIONS AND MONITORING REQUIREMENTS – Outfall 102

1. The permittee shall monitor the TRC at the outlet of the chlorine contact tank, prior to mixing with any process wastewater, 3/Day at 4 hour intervals by grab sample.
2. No more than 9 samples taken at the outlet of the chlorine contact tank, prior to mixing with any process wastewater, shall be less than 1.0 mg/L for any one calendar month.
3. No TRC sample collected at the outlet of the chlorine contact tank, prior to mixing with any process wastewater, shall be less than 0.6 mg/L.
4. If dechlorination facilities exist, the samples above shall be collected prior to dechlorination.
5. If chlorine disinfection is not used, E. coli shall be limited and monitored by the permittee as specified below:

	<u>Discharge Limit</u>	<u>Monitoring Requirements</u>	
	<u>Monthly Average</u>	<u>Frequency</u>	<u>Sample Type</u>
E. coli (N/100 mL)	126 (Geometric Mean)	3/Week Between 10 a.m. and 4 p.m. at 48-Hr. Intervals	Grab

This E. coli requirement, if applicable, shall substitute for the TRC (and E. coli) requirements specified elsewhere in this permit.

C. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - ADDITIONAL INSTRUCTIONS

1. Quantification Levels (QLs)

- a. For the following parameters, QLs shall be less than or equal to the following concentrations:

<u>Effluent Characteristic</u>	<u>QL</u>
BOD,	2 mg/L
Suspended Solids	1.0 mg/L
Chlorine	0.10 mg/L
Ammonia-N	0.20 mg/L
Chemical Oxygen Demand	10 mg/L
Total Cyanide	10 µg/L
Phenol	10 µg/L
Benzene	10 µg/L
Toluene	10 µg/L
Chloroform	10 µg/L
1,2-Dichloroethane	10 µg/L
o-Dichlorobenzene	10 µg/L
Methylene Chloride	20 µg/L
Chlorobenzene	50 µg/L

- b. For the following parameters, the QL is at the discretion of the permittee. For any substances addressed in 40 CFR Part 136, the permittee shall use one of the approved methods in 40 CFR Part 136.

Acetone
4-Methyl-2-pentanone (MIBK)
Isobutyraldehyde
n-Amyl acetate
n-Butyl acetate
Ethyl acetate
Isopropyl acetate
Methyl formate
Amyl Alcohol
Ethanol
Isopropanol
Methanol
Methyl Cellosolve
Dimethyl Sulfoxide
Triethylamine
n-Hexane
n-Heptane
Tetrahydrofuran
Isopropyl ether
Diethylamine
Acetonitrile
Xylenes

2. Compliance Reporting

- a. Monthly Average – Compliance with the monthly average limitations and/or reporting requirements for the parameters listed in Part I.C.1. above shall be determined as follows: All data below the test method QL shall be treated as zeros. All data equal to or above the test method QL shall be treated as reported. Arithmetic concentration and/or loading averages (as applicable) shall be calculated using all reported data for the month, including the defined zeros. These averages shall be reported on the Discharge Monitoring Report (DMR). If all data are less than the test method QL, then “<QL” shall be reported on the DMR for the concentration and/or loading values. Otherwise, the average values shall be reported as calculated.
- b. Daily Maximum – Compliance with the daily maximum limitations and/or reporting requirements for the parameters listed in Part I.C.1. above shall be determined as follows: All data below the test method QL shall be treated as zeros. All data equal to or above the test method QL shall be treated as reported. An arithmetic average shall be calculated using all reported data, including the defined zeros, collected within each day during the reporting month. The maximum value of these daily averages thus determined shall be reported on the DMR as the Daily Maximum. If all data are less than the test method QL, then “<QL” shall be reported on the DMR for the concentration and/or loading values.
- c. Any single datum required shall be reported as “<QL” if it is less than the test method QL. Otherwise, the numerical value shall be reported.
- d. The permittee shall report at least the same number of significant digits as the permit limit for a given parameter. Regardless of the rounding convention used (i.e., § always rounding up or to the nearest even number) by the permittee, the permittee shall use the convention consistently, and shall ensure that consulting laboratories employed by the permittee use the same convention.

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Author: kirkkar Subject: Cross-Out Date: 10/20/2011 10:06:19 AM

Author: kirkkar Subject: Inserted Text Date: 10/20/2011 10:10:49 AM
started within 30 days of the original sample (Comment - this condition gives greater flexibility to carry out sampling in the worst case - when the operations have returned to full capacity after the summer shut down)

D. WHOLE EFFLUENT TOXICITY (WET) REQUIREMENTS

1. In accordance with the schedule in Part I.D.4., the permittee shall conduct annual acute and chronic toxicity tests using 24-hour flow-proportioned composite samples of final effluent collected from Outfall 001.

The acute test shall be a 48-Hour Static Acute test using *Ceriodaphnia dubia*. Each test shall be performed with a minimum of 5 dilutions, derived geometrically, for calculation of a valid LC₅₀. Express the results as Acute Toxicity Units (TU_a) by dividing 100/LC₅₀. Tests in which control survival is less than 50% are not acceptable.

The chronic tests shall be a Chronic 3-Brood Static Renewal Survival and Reproduction Test using *Ceriodaphnia dubia*. Each test shall be performed with a minimum of 5 dilutions, derived geometrically, in order to determine the No Observed Effect Concentration (NOEC) for survival and reproduction. Results which cannot be determined (i.e., a "less than" or "zero" NOEC value) are not acceptable, and a retest requiring further dilution must be performed for the test period. Such "less than" or "zero" results must be submitted and will be regarded as evidence of effluent toxicity. Express the results as chronic Toxicity Units (TU_c) by dividing 100/NOEC. Report the LC₅₀ for each chronic test at the 48-hour point, and the IC₅₀, if calculable, with the NOECs in the required test report.

Any retest of a non-acceptable test must be performed within the same testing period.

During the term of the permit, the permittee may provide additional samples to address data variability. These data shall be reported and may be included in the evaluation of effluent toxicity. Test procedures and reporting shall be in accordance with the WET testing methods cited in 40 CFR 136.3.

2. The test dilutions shall be able to determine compliance with the following endpoints:
 - a. Acute LC₅₀ of 100%, equivalent to 1.0 TU.
 - b. Chronic NOEC of 15%, equivalent to 6.66 TU.
3. The test data will be evaluated for reasonable potential at the conclusion of the test period. The data may be evaluated sooner if requested by the permittee, or if toxicity has been noted. Should evaluation of the data indicate that a limit is needed, a WET limit and compliance schedule may be required and the toxicity tests of Part I.E.1. may be discontinued. If the data indicate that no limit is needed, the permittee shall continue acute and chronic toxicity testing of the outfall annually, as specified in Part I.E.4.
4. The permittee shall supply 1 copy of the test report for the toxicity tests specified in Part I.E.1. in accordance with the following schedule:

Monitoring Period	Testing Period	Submitted by
1 st Annual	8/1/2012 to 9/30/2012	1/10/13
2 nd Annual	8/1/2013 to 9/30/2013	1/10/14
3 rd Annual	8/1/2014 to 9/30/2014	1/10/15
4 th Annual	8/1/2015 to 9/30/2015	1/10/16
5 th Annual	8/1/2016 to 9/30/2016	12/10/16

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E. OTHER REQUIREMENTS AND SPECIAL CONDITIONS

1. 95% Capacity Reopener – A written notice and a plan of action for ensuring continued compliance with the terms of this permit shall be submitted to:

Department of Environmental Quality
Valley Regional Office
P.O. Box 3000
Harrisonburg, Virginia 22801

when the monthly average influent flow to the wastewater treatment facility reaches 95 percent of the design capacity authorized in this permit for each month of any six consecutive month period. The written notice shall be submitted within 30 days and the plan of action shall be received at the DEQ-Valley Regional Office no later than 90 days from the third consecutive month for which the flow reached 95 percent of the design capacity. The plan shall include the necessary steps and a prompt schedule of implementation for controlling any current or reasonably anticipated problem resulting from high influent flows. Failure to submit an adequate plan in a timely manner shall be deemed a violation of this permit.

2. Materials Handling/Storage – Any and all product, materials, industrial wastes, and/or other wastes resulting from the purchase, sale, mining, extraction, transport, preparation, and/or storage of raw or intermediate materials, final product, by-product or wastes, shall be handled, disposed of, and/or stored in such a manner so as not to permit a discharge of such product, materials, industrial wastes, and/or other wastes to State waters, except as expressly authorized.

3. Operations and Maintenance (O&M) Manual Requirements –

- a. The permittee shall maintain a current and approved O&M Manual for the treatment works. This manual shall detail the practices and procedures which will be followed to ensure compliance with the requirements of this permit. This manual shall include, but not necessarily be limited to, the following items:

- (1) Treatment system design, treatment system operation, routine preventive maintenance of units within the treatment system, critical spare parts inventory and record keeping;
- (2) Techniques to be employed in the collection, preservation, and analysis of effluent samples;
- (3) Procedures for handling, storing, and disposing of all wastes, fluids, and pollutants characterized in Part I.E.2. that will prevent these materials from reaching state waters;
- (4) Procedures for documenting compliance with the permit requirement that there shall be no discharge of floating solids or visible foam in other than trace amounts; and
- (5) A plan for the management and/or disposal of waste solids/residues.

The permittee shall operate the treatment works in accordance with the approved O&M Manual. Any changes in the practices and procedures followed by the permittee shall be documented and submitted for DEQ approval within 90 days of the effective date of the changes. Upon approval of the submitted manual changes, the revised manual becomes an enforceable part of the permit. Noncompliance with the O&M Manual shall be deemed a violation of the permit.

- b. Within 60 days of the effective date of the permit, the permittee shall submit to the DEQ-Valley Regional Office for approval revisions to the O&M Manual that address documenting compliance with the permit requirement that there shall be no discharge of floating solids or visible foam in other than trace amounts.

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4. Concept Engineering Report (CER) Requirement – This facility shall submit a CER for DEQ approval prior to installation of any nutrient removal wastewater treatment technology. Upon approval of a CER for the installation of nutrient removal technology, DEQ staff shall initiate modification or, alternatively, revocation and reissuance, of this permit to include annual concentration limits based on the technology proposed in the CER. The permittee shall inform the DEQ regional office within 14 days of completion of construction of any project for which a CER has been approved. Upon completion of construction in accordance with a CER that has been approved by DEQ, any nutrient removal facilities installed shall be operated to achieve the design effluent TN and TP concentrations.
5. Sludge Management Plan (SMP) Requirement – The permittee shall conduct all sewage sludge use or disposal activities in accordance with the SMP approved with the reissuance of this permit. Any proposed changes in the sewage sludge use or disposal practices or procedures followed by the permittee shall be documented and submitted for DEQ approval 90 days prior to the effective date of the changes. Upon approval, the SMP becomes an enforceable part of the permit. This permit may be modified or, alternatively, revoked and reissued to incorporate limitations/conditions necessitated by substantive changes in sewage sludge use or disposal practices.
6. Licensed Operator Requirement – The permittee shall employ or contract at least one Class II licensed wastewater works operator for this facility. The license shall be issued in accordance with Title 54.1 of the Code of Virginia and the regulations of the Board for Waterworks and Wastewater Works Operators. The permittee shall notify the DEQ-Valley Regional Office in writing whenever he is not complying, or has grounds for anticipating he will not comply with this requirement. The notification shall include a statement of reasons and a prompt schedule for achieving compliance.
7. Water Quality Criteria Monitoring – The permittee shall monitor the effluent at Outfall 001 for the substances noted in Attachment A of this permit according to the indicated analysis number, quantification level, sample type and frequency. Monitoring shall be initiated after the start of the third year from the permit's effective date. Using Attachment A as the reporting form, the data shall be submitted with the next permit reissuance application which is due at least 180 days prior to the expiration date of this permit. Monitoring and analyses shall be conducted in accordance with 40 CFR Part 136 or alternative EPA approved method. Methods other than those specified in Attachment A may be used with prior notification to and approval from DEQ. It is the responsibility of the permittee to ensure that proper QA/QC protocols are followed during the sample gathering and analytical procedures. DEQ will use these data for making specific permit decisions in the future. This permit may be modified or, alternatively, revoked and reissued to incorporate limits for any of the substances listed in Attachment A.
8. Reopeners – This permit may be modified or, alternatively, revoked and reissued:
 - a. If any approved waste load allocation procedure, pursuant to Section 303(d) of the Clean Water Act, imposes waste load allocations, limits or conditions on the facility that are not consistent with the permit requirements; or
 - b. To incorporate technology-based effluent concentration limitations for nutrients in conjunction with the installation of nutrient control technology, whether by new construction, expansion or upgrade; or
 - c. To incorporate alternative nutrient limitations and/or monitoring requirements, should:
 - (1) the State Water Control Board adopt new nutrient standards for the water body receiving the discharge, including the Chesapeake Bay or its tributaries; or
 - (2) a future water quality regulation or statute require new or alternative nutrient control; or
 - d. If any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the Clean Water Act is more stringent than any requirements for sludge use or disposal in this permit, or controls a pollutant or practice not limited in this permit.

VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a Major Industrial permit. The effluent limitations contained in this permit will maintain the Water Quality Standards (WQS) of 9 VAC 25-260. The discharge results from the treatment of production and sanitary wastewater generated at a pharmaceutical manufacturing facility, non-contact cooling water, and storm water generated in the area around the facility. The permit action consists of reissuing the permit with revisions to the permit, as needed, due to changes in applicable laws, guidance, and available technical information.

1. Facility Name and Address:
Merck Sharp & Dohme Corp. – Stonewall Plant
2778 South Eastside Highway
Elkton, VA 22827
Location: 2778 South Eastside Highway, Elkton

SIC Code: 2833 – Medicinal Chemicals & Botanical Products
2834 – Pharmaceutical Preparations

2. Permit No. VA0002178 Expiration Date: December 31, 2011

3. Owner: Merck Sharp & Dohme Corp., a Division of Merck & Co.
Contact Name: John A. McCloskey
Title: Environmental Manager
Telephone No: 540-298-4122

4. Application Complete Date: July 5, 2011

Permit Drafted By: Dawn Jeffries Date:
Reviewed By: Eric Millard Date:

Public Comment Period: _____ to _____

5. Receiving Stream Name: South Fork (S.F.) Shenandoah River River Mile: 88.09
Basin: Potomac Subbasin: Shenandoah
Section: 3 Class: IV
Special Standards: pH Impaired: Yes No Tidal Waters: Yes No
Watershed Name: VAV-B35R South Fork Shenandoah River/Elk Run/Boone Run

6. Operator License Requirements per 9 VAC 25-31-200.C: II

7. Reliability Class per 9 VAC 25-790: N/A

8. Permit Characterization:

Private Federal State POTW PVOTW
 Possible Interstate Effect Interim Limits in Other Document (attach copy of CSO)

9. Description of Treatment Works Treating Domestic Sewage: Appendix A

Total Number of Outfalls = 2 external, 2 internal
Operation and Maintenance (O&M) Manual Approval: May 16, 2011

Summary of Comments on Fact Sheet 2012.docx

This page contains no comments

Fact Sheet – VPDES Permit No. VA0802178 – Merck Sharp & Dohme Corp. - Stonewall Plant

10. Discharge Location Description and Receiving Waters Information:

Appendix B

11. Antidegradation Review & Comments per 9 VAC 25-260-30. Tier: 1

The State Water Control Board's WQS includes an antidegradation policy. All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 waters have water quality that is better than the WQS. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 waters are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with a Tier determination. South Fork Shenandoah River below the Merck & Co., Inc.-Stonewall Plant discharge has been determined to be a Tier 1 water. This finding is based on the fact that the stream is listed in Part I of the currently approved 303(d) list as impaired for aquatic life (benthics). Antidegradation baselines are not calculated for Tier 1 waters.

12. Site Inspection: Performed by: Dawn Jeffries

Date: June 29, 2011

13. NPDES Permit Rating Worksheet:

The worksheet prepared for reissuance of this permit in 2006 was updated using current information provided in the application and permit and information regarding the facility.

Major Minor Score = 145

Appendix A

14. Effluent Screening and Effluent Limitations:

Appendix C

15. Effluent toxicity testing requirements included per 9 VAC 25-31-220.D: Yes No

Appendix D

16. Management of Sludge:

Sludge from the industrial wastewater treatment plant is dewatered using a belt press, dried with a steam-heated dryer, bagged, and hauled to Rockingham County Landfill for disposal. Sludge from the sewage treatment plant is pumped and hauled by a licensed hauler to North River WWTF for additional treatment and disposal.

17. Permit Changes and Bases for Special Conditions:

Appendix E

18. Material Storage per 9 VAC 25-31-280.B.2: This permit requires that the facility's O&M Manual include information to address the management of wastes, fluids, and pollutants which may be present at the facility, to avoid unauthorized discharge of such materials.

19. Antibacksliding Review per 9 VAC 25-31-220.L: This permit complies with Antibacksliding provisions of the VPDES Permit Regulation.

20. Impaired Use Status Evaluation per 9 VAC 25-31-220.D: The South Fork Shenandoah River in the immediate vicinity of the discharge is listed as impaired in the current approved 303(d) list for bacteria, aquatic life (benthics), and "Fish Consumption" due to Hg contamination. TMDLs for bacteria and the Hg contamination have been prepared and approved for the segment. This facility was not assigned a wasteload allocation (WLA) in the mercury TMDL because the effluent from this facility is not expected to contain mercury. The facility has been assigned an E. coli WLA of 2.09×10^{12} cfu/yr in the bacteria TMDL. A TMDL for the aquatic life impairment has not been prepared. The permit contains a re-opener condition that may allow the permit limits to be modified, in compliance with section 303(d)(4) of the Act once a TMDL is approved.

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Author: kirkpeter Subject: Crash-Out Date: 10/20/2011 1:31:20 PM

Author: kirkpeter Subject: Inserted Text Date: 10/20/2011 1:32:05 PM
150 (Appendix A score = 40+50+40+10+10= 150)

Fact Sheet – VPDES Permit No. VA0002178 – Merck Sharp & Dohme Corp. - Stonewall Plant

Page: 7

NPDES PERMIT RATING WORK SHEET

NPDES NO. VA0002178

Facility Name: Merck & Co., Inc. - Stonewall Plant

City: Elkton, VA

Receiving Water: South Fork Shenandoah River

Reach Number: _____

Is this facility a steam electric power plant (SIC=4911) with one or more of the following characteristics?

1. Power output 500 MW or greater (not using a cooling pond/lake)
2. A nuclear power plant
3. Cooling water discharge greater than 25% of the receiving stream's TQ10 flow rate

? YES: score is 600 (stop here) NO (continue)

- ? Regular Addition
 Discretionary Addition
 Score change, but no status change
 Deletion

[Author: Kirpaker Subject: Cross-Cut Date: 10/20/2011 1:10:17 PM]
 Author: Kirpaker Subject: Inserted Text Date: 10/20/2011 1:10:11 PM
 Sharp & Dohme Corp.

Is this permit for a municipal separate storm sewer serving a population greater than 100,000?

- ? YES: score is 700 (stop here)
 NO (continue)

FACTOR 1: Toxic Pollutant Potential

PCS SIC Code: 2833 Primary SIC Code: 2833 Other SIC Codes: 2834
 Industrial Subcategory Code: 003 (Code 000 if no subcategory)

Determine the Toxicity potential from Appendix A. Be sure to use the TOTAL toxicity potential column and check one:

Toxicity Group	Code	Points	Toxicity Group	Code	Points	Toxicity Group	Code	Points
[] No process waste streams			[] 3.	3	15	[] 7.	7	35
[] 1.	1	5	[] 4.	4	20	[X] 8.	8	40
[] 2.	2	10	[] 5.	5	25	[] 9.	9	45
			[] 6.	6	30	[] 10.	10	50

Code Number Checked: 8

Total Points Factor 1: 40

FACTOR 2: Flow/Stream Flow Volume (Complete either Section A or Section B; check only one)

Section A X Wastewater Flow Only Considered

Section A X Wastewater Flow Only Considered			Section B 7 Wastewater and Stream Flow Considered					
Wastewater Type (See Instructions)	Code	Points	Wastewater Type (See Instructions)	Percent of Indirect Wastewater Concentration at Receiving Stream Low Flow	Code	Points		
Type I: Flow < 5 MGD	?	11	0					
Flow 5 to 10 MGD	?	12	10					
Flow > 10 to 50 MGD	?	13	20					
Flow > 50 MGD	?	14	30	Type II/III:	< 10 %	7	41	0
Type II: Flow < 1 MGD	?	21	10		10 % to < 50 %	?	42	10
Flow 1 to 5 MGD	?	22	20		> 50 %	?	43	20
Flow > 5 to 10 MGD	?	23	30					
Flow > 10 MGD	X	24	50					
Type III: Flow < 1 MGD	?	31	0	Type II:	< 10 %	?	51	0
Flow 1 to 5 MGD	?	32	10		10 % to < 50 %	?	52	20
Flow > 5 to 10 MGD	?	33	20		> 50 %	?	53	30
Flow > 10 MGD	?	34	30					

Code Checked from Section A or B: 24
 Total Points Factor 2: 50

Fact Sheet – VPDES Permit No. VA0002178 – Merck Sharp & Dohme Corp. - Stonewall Plant

FACTOR 3: Conventional Pollutants
(only when limited by the permit)

A. Oxygen Demanding Pollutant (check one) BOD ? COD ? Other _____

Permit Limits: (check one)	?	Code	Points
?	< 100 lbs/day	1	0
?	100 to 1000 lbs/day	2	5
?	> 1000 to 3000 lbs/day	3	15
X	> 3000 lbs/day	4	20

Code Checked: 4

Points Scored: 20

B. Total Suspended Solids (TSS)

Permit Limits: (check one)	?	Code	Points
?	< 100 lbs/day	1	0
?	100 to 1000 lbs/day	2	5
X	> 1000 to 3000 lbs/day	3	15
?	> 3000 lbs/day	4	20

Code Checked: 3

Points Scored: 15

C. Nitrogen Pollutant: (check one) Ammonia ? Other _____

Permit Limits: (check one)	?	Nitrogen Equivalent	Code	Points
?	< 300 lbs/day	1	0	0
X	300 to 1000 lbs/day	2	5	5
?	> 1000 to 3000 lbs/day	3	15	15
?	> 3000 lbs/day	4	20	20

Code Checked: 2

Points Scored: 5

Total Points Factor 3: 35

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[REDACTED] Author:kirkkar Subject: Cross-Out Date: 10/20/2011 1:30:01 PM

[REDACTED] Author:kirkkar Subject: Inserted Text Date: 10/20/2011 1:30:23 PM

FACTOR 4: Public Health Impact

Is there a public drinking water supply located within 50 miles downstream of the effluent discharge (this includes any body of water to which the receiving water is a tributary)? A public drinking water supply may include infiltration galleries, or other methods of conveyance that ultimately get water from the above referenced supply.

X YES (if yes, check toxicity potential number below)

? NO (If no, go to Factor 5)

Determine the *human health* toxicity potential from Appendix A. Use the same SIC code and subcategory reference as in Factor 1. (Be sure to use the *human health* toxicity group column ? check one below)

Toxicity Group	Code	Points	Toxicity Group	Code	Points	Toxicity Group	Code	Points
? No process waste streams	0	0	? 1.	3	0	? 7.	7	15
?	1	0	? 4.	4	0	? 8.	8	20
?	2.	0	? 5.	5	5	? 9.	9	25
X	6.	10	? 10.	10	30			

Code Number Checked: 6

Total Points Factor 4: 10

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MEMORANDUM
DEPARTMENT OF ENVIRONMENTAL QUALITY
VALLEY REGIONAL OFFICE

4411 Early Road – P.O. Box 3000 Harrisonburg, VA 22801
SUBJECT: Site Visit for Reissuance of VPDES Permit No. VA0002178, Merck & Co., Inc. - Stonewall Facility, Rockingham County
TO: Permit Processing File
FROM: Dawn Jeffries
DATE: June 30, 2011

On June 29, 2011 the writer performed a site visit at the subject facility. Photos of the external outfalls are shown below.



Outfall location 001 (submerged diffuser)



Outfall 002

APPENDIX C**EFFLUENT SCREENING AND EFFLUENT LIMITATIONS****EFFLUENT LIMITATIONS**

A comparison of technology and water quality-based limits was performed, and the most stringent limits were selected. The selected limits are summarized in the table below.

PARAMETER	BASIS FOR LIMITS	Final Limits		Calculated Flow: 10.86 MGD	
		DISCHARGE LIMITS		MONITORING REQUIREMENTS	
		Monthly Average	Maximum	Frequency	Sample Type
Flow (mgd)	1	NL	NL	Continuous	TIRE
BOD ₅	1	NL (mg/L)	NL (mg/L)	1/Month	24 HC
		NL (kg/d)	NL (kg/d)		
TSS	1	NL (mg/L)	NL (mg/L)	1/Month	24 HC
		NL (kg/d)	NL (kg/d)		
COD	1	NL (mg/L)	NL (mg/L)	1/Month	24 HC
		NL (kg/d)	NL (kg/d)		
Ammonia-N	1	NL (mg/L)	NL (mg/L)	1/Month	24 HC
		NL (kg/d)	NL (kg/d)		
Total Kjeldahl Nitrogen (as N)kg/d)	1,7	1291	2600	1/Month	24 HC
Total Cyanide	1,4	2.8 (kg/d)	0.26 (mg/l)	1/Week	Grab
Effluent Chlorine (TRC)(mg/L)*	2	0.087	0.18	1/Day	Grab
		Minimum	Maximum		
pH (S.U.)	2.5	6.5	9.0	Continuous	Recorded
Temperature (°C)	3.7	NA	37	Continuous	Recorded
Dissolved Oxygen (mg/L)	2.3	4.5	NA	1/Day	Grab

NL = No Limitation, monitoring required

NA = Not Applicable

TIRE = Totalizing, Indicating, and Recording equipment

24 HC = 24 Hour composite sample

* = Applicable regardless of form of disinfection used

Bases for Effluent Limitations

1. Best Professional Judgment (BPJ)
2. Water Quality Standards
3. 2011 ECS, LLC, stream modeling report
4. 1993 Law Environmental, Inc. stream modeling report
5. Federal Effluent Guideline Limitations for the Pharmaceutical Manufacturing Category, 40 CFR Parts 136 and 439
6. Potomac-Shenandoah River Basin Water Quality Management Plan (WQMP)
7. Limit carried forward based on 9 VAC 25-31-220 L

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Outfall No. 101 (Internal Outfall)

PARAMETER	BASIS FOR LIMITS	Average Design Flow = 1.2 MGD			
		DISCHARGE LIMITS	MONITORING REQUIREMENTS		
		Monthly Average	Maximum	Frequency	Sample Type
Flow (MGD)	2	NL	NL	Continuous	TIRE
BOD ₅ (kg/d)	1	990	2700	1/Week	24 HC
TSS (kg/d)	1	1700	3400	1/Week	24 HC
COD (kg/d)	1	3400	6600	1/Week	24 HC
Ammonia-N (kg/d)	1	120	340	1/Week	24 HC
Acetone (kg/d)	1	0.81	2.0	1/6 Months	Composite
Acetonitrile (kg/d)	1	41	100	1/6 Months	Composite
n-Amyl Acetate (kg/d)	1	2.0	5.3	1/6 Months	Composite
Amyl Alcohol (kg/d)	1	17	40	1/6 Months	Composite
Benzene (kg/d)	1	0.081	0.20	1/6 Months	Composite
n-Butyl Acetate (kg/d)	1	2.0	5.3	1/6 Months	Composite
Chlorobenzene (kg/d)	1	0.24	0.61	1/6 Months	Composite
Chloroform (kg/d)	1	0.053	0.081	1/6 Months	Composite
o-Dichlorobenzene (kg/d)	1	0.24	0.61	1/6 Months	Composite
1,2-Dichloroethane (kg/d)	1	0.40	1.6	1/6 Months	Composite
Diethylamine (kg/d)	1	410	1000	1/6 Months	Composite
Dimethyl Sulfoxide (kg/d)	1	150	370	1/6 Months	Composite
Ethanol (kg/d)	1	17	40	1/6 Months	Composite
Ethyl Acetate (kg/d)	1	2.0	5.3	1/6 Months	Composite
n-Heptane (kg/d)	1	0.081	0.20	1/6 Months	Composite
n-Hexane (kg/d)	1	0.081	0.12	1/6 Months	Composite
Isobutylaldehyde (kg/d)	1	2.0	4.9	1/6 Months	Composite
Isopropanol (kg/d)	1	6.5	16	1/6 Months	Composite
Isopropyl Acetate (kg/d)	1	2.0	5.3	1/6 Months	Composite
Isopropyl Ether (kg/d)	1	11	34	1/6 Months	Composite
Methanol (kg/d)	1	17	40	1/6 Months	Composite
Methyl Cellosolve (kg/d)	1	160	400	1/6 Months	Composite
Methylene Chloride (kg/d)	1	1.2	3.6	1/6 Months	Composite
Methyl Formate (kg/d)	1	2.0	5.3	1/6 Months	Composite
MIBK (kg/d)	1	0.81	2.0	1/6 Months	Composite
Phenol (kg/d)	1	0.081	0.20	1/6 Months	Composite
Tetrahydrofuran (kg/d)	1	11	34	1/6 Months	Composite
Toluene (kg/d)	1	0.081	0.24	1/6 Months	Composite
Trichlyamine (kg/d)	1	410	1000	1/6 Months	Composite
Xylenes (kg/d)	1	0.040	0.12	1/6 Months	Composite

TIRE = Totalizing, Integrating, and Recording

Bases for Effluent Limitations

1. Federal Effluent Guideline Limitations (FEGL) for the Pharmaceutical Manufacturing Category, 40 CFR Part 439
2. Facility Design Flow
3. Limits are expressed to two significant figures.

Fact Sheet – VPDES Permit No. VA0002178 – Merck Sharp & Dohme Corp. - Stonewall Plant

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Author: kirkpar
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Outfall No. 102 (Internal Outfall)

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS		MONITORING REQUIREMENTS		Design Flow = 0.150 MGD
		Monthly Average	Maximum	Frequency	Sample Type	
Flow (MGD)	1	NL	NL	Continuous	TIRE	
E. coli (geometric mean) ^a	2	126 N/100 mL	NA	4/Month between 10 am and 4 pm	Grab	
E. coli (geometric mean) ^b	2	126 N/100 mL	NA	3/Week between 10 am and 4 pm	Grab	
		Minimum	Maximum			
Contact Chlorine (TRC) ^c	1	1.0 mg/L	NA	3/Day at 4-hr intervals	Grab	

TIRE = Totalizing, Indicating, and Recording

NL = No Limit, monitoring required

NA = Not Applicable

4/Month = 4 samples taken weekly during the calendar month

3/Week = 3 samples taken during the calendar week, no less than 48 hours apart

Bases for Effluent Limitations

1. Best Professional Judgment (BPJ)
2. Water Quality Standards

Footnotes:

a - Applicable only if chlorination is used for disinfection.

b - Applicable only if alternative to chlorination is used for disinfection (e.g. Ultraviolet (UV) radiation).

c - Sampling interval for TRC-Contact is the minimum requirement and can be increased if additional staffing is available. Deviation from the prescribed sampling interval must be acknowledged in the O&M Manual. TRC-Contact, or E. coli, is to be sampled at the end of the Chlorine Contact Tank prior to mixing with any process water.

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APPENDIX D

RATIONALE FOR WHOLE EFFLUENT TOXICITY (WET) REQUIREMENTS

Applicability of WET Requirements: The applicability criteria for a facility to perform toxicity testing are contained in the Departments Guidance Memo No. 00-2012, Toxics Management Program Implementation Guidance, 08/24/00, Part IV. WET requirements apply to this facility because the Standard Industrial Codes (SIC) for Merck & Co., Inc. are 2833 and 2834 which are included in Appendix A of the TMP Guidance.

Summary of Toxicity Testing: The current permit requires annual acute and chronic testing using *Ceriodaphnia dubia*. Tables 1 and 2 contain a summary of the toxicity testing results during the term of the permit. These data were evaluated using the procedures outlined in the TMP guidance.

Calculation of WLAs: WLAs were generated from the Department's WETLim10.xls spreadsheet by entering the facility flow, stream flows, and a 100% stream mix based on the use of a diffuser (See Table 3).

Chronic Dilution Series: The recommended dilution series is 100%, 39%, 15%, 5.8%, 2.3%. The midpoint of the dilution series is 15%, equivalent to a TUc of 6.66. The midpoint of the dilution series is derived from the highest anticipated mean of the data expressed as Chronic Toxicity Unit (TUc) that will not trigger a limit in the Department's Stat.exe program.

Stat.exe Limit Evaluation: The WLAs are used in the Department's Stat.exe program in order to perform a statistical evaluation of the acute and chronic test results expressed as Toxicity Units (TUs). The toxicity data are analyzed separately by species and test type (acute or chronic).

Chronic Stat.exe Limit Evaluation:
The summary of the chronic toxicity testing data are shown in Table 2. The results of the Stat.exe evaluation are shown in Table 5. Based on the evaluation of the chronic toxicity data, a WET limit is not required at this time; therefore, compliance monitoring shall be continued on an annual basis.

Acute Stat.exe Limit Evaluation:
The summary of the acute toxicity testing data are shown in Table 1. The results of the Stat.exe evaluation are shown in Table 5. Based on the evaluation of the acute toxicity data, a WET limit is not required at this time; therefore, compliance monitoring shall be continued on an annual basis.

Midpoint Check Stat.exe Evaluation:
The midpoint of the chronic test dilution series (Table 4) was evaluated using Stat.exe to determine if limits would be inappropriately triggered (Table 5). The midpoint was entered as a chronic Toxicity Unit (TUc). Since no limit was triggered by the midpoint, the recommended dilution series can be used without the need for adjustment.

The more-sensitive species was determined to be *Ceriodaphnia dubia* at the 2007 permit reissuance. This has been carried forward in this reissuance. The frequency of testing has been continued as annually. Since quarterly testing at the beginning of the previous permit term identified August as being the period of apparent toxicity, and the testing period was established as August-September. This has been carried forward in this reissuance.

Reviewer: BWC
Date: 7/20/11

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Table 1
Summary of Acute Toxicity Testing (LC₅₀)

Monitoring Period (August-September)	Test Date	48-Hr. Static Acute <i>Ceriodaphnia dubia</i> (TU _a)	48-Hr. Static Acute <i>Ceriodaphnia dubia</i> (% Survival in 100% Effluent)
1 st Annual	Aug - Sep 2007	1.4	0%
2 nd Annual	Aug - Sep 2008	<1.0	100%
3 rd Annual	Aug - Sep 2009	<1.0	100%
4 th Annual	Aug - Sep 2010	<1.0	100%
5 th Annual	Aug - Sep 2010	1.19	40%

Table 2
Summary of Chronic Toxicity Testing

Monitoring Period	Test Date	Chronic 3-Brood Static Renewal Survival and Reproduction, <i>Ceriodaphnia dubia</i>		48-hr LC ₅₀	% Survival in 100% Effluent
		Survival (TUC)	Reproduction (TUC)		
1 st Annual	Aug - Sep 2007	1.0	1.8	>100%	70%
2 nd Annual	Aug - Sep 2008	1.83	1.83	87.3%	0%
3 rd Annual	Aug - Sep 2009	1.0	1.0	>100%	100%
4 th Annual	Aug - Sep 2010	1.0	1.0	>100%	100%
5 th Annual	Aug - Sep 2010	1.0	1.0	>100%	100%

Jeffries, Dawn (DEQ)

From: Kirpekar, Abhay C [abhay_kirpekar@merck.com]
Sent: Wednesday, August 31, 2011 9:02 AM
To: Jeffries, Dawn (DEQ)
Cc: McCloskey, John A
Subject: Merck - Stonewall Plant, Elkton, VA. VPDES Permit VA0002178
Attachments: Influent BOD-COD-TSS Data Analysis.xls

Dear Ms. Dawn Jeffries,

Per our phone conversation, I have analyzed the influent data for the determination of BOD, TSS and COD limits (MAL and DML).

Merck requests that the period of time used to evaluate the LTA influent COD/BOD be adjusted to five years instead of the three years listed in the Guidelines. This request is made on the belief that the highest 12 month influent load experienced in the last five years is more indicative of potential and future needs. Analysis of the influent data shows that the highest 1-year average load occurred in 2008.

Our influent load (COD/BOD) changes as a result of the amount and type of pharmaceutical products manufactured at any give time to meet the global medical needs. Future projections of existing and new pharmaceutical products at Merck -Stonewall Plant show the long term average load comparable to the average historical load; however, introduction of new products to this site is expected to increase the load variation. It is thus requested that 2008 average load be used for the calculation of BOD MAL and 95 percentile load for 2008 be used for the calculation of BOD DML.

A worksheet containing the COD/BOD data, calculation of the yearly averages, histogram for 2008 (for 95 percentile determination) and limits is attached.

If you have any questions please let me know.

Sincerely,

Abhay Kirpekar
Merck - Elkton Environmental
(540) 298-4802

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BOD Limit Calculations - MAL and DML

(1) For MAL - Merck requests that the year 2008 (LTA) BOD data be used.

From this LTA: 3287 kg/day

MAL = 3287 x 0.1 x 3.0 =	986 kg/day
DML = 986 x 2 =	1972 kg/day (as per BJP)

(2) For DML - Merck requests that the year 2008 (95 percentile) BOD data be used.

From this 95% data: 7000 kg/day

MAL = 7000 x .1 x 3.0 =	2100 kg/day
DML = 2100 x 2.0 =	4200 kg/day (as per BJP)

2007-2011 BOD Permit Limits:

MAL =	1567	kg/day
DML =	3100	kg/day

For 2012 - 2016 Permit

Request BOD permit limits		
MAL =	986	kg/day
DML =	3100	kg/day

August 8, 2011



Ms. Dawn Jeffries
 Environmental Engineer
 Department of Environmental Quality
 Valley Regional Office
 4411 Early Road
 Harrisonburg, VA 22801

DEQ-VALLEY

AUG 09 2011

Re: Reissuance of VPDES Permit No. VA0002178
Merck Sharp & Dohme Corp. – Stonewall Plant
Rockingham County

TO: _____
 FILE: _____

Dear Ms. Jeffries:

Please find the information you requested in the attached documents.

- 1) Attachment 1, Form 2C, Part II A: Review of the Merck's correspondence dated 20th January 2004 to DEQ indicates that 1.2 MGD was determined to be the average design flow at the Outfall 101 location. The studies carried out at that time showed that the plant was rated for 1.5 MGD with a maximum flow of 1.8 MGD. Attachment 1, Form 2C, Part II A is updated and provided for your review.
- 2) Addendum 1: Is a part of the above attachment. Flow data at Outfall 101 since the upgrade (not expansion) of our WWTP to BNR (biological nutrient reduction) system for the Chesapeake Bay TMDL shows that our average flow is 1.025 MGD. The upgrade project involved two engineering contractors: Obrien & Gere (for conceptual design) and Stearns & Wheler (for BNR design and engineering). Both firms used 1.2 MGD as the average design flow for the nutrient removal project. The data obtained since the upgrade shows that the 95% flow is 1.5 MGD. It also demonstrates that the system is capable of handling a peak flow of 2.1 MGD. Merck thus requests that mass loading calculations be based on the average design flow of 1.2 MGD and peak design flow be 2.1 MGD.
- 3) Addendum 2: Is a part of Attachment 1, Form 2C, Part II A. Analysis of the well water withdrawal rate from 2007 through 2010 (4 years) is provided in this addendum. The non-wastewater flow (non contact cooling water flow and storm water flow) based on this analysis remains the same as that of the previous permit (95 percentile well water withdrawal flow and storm water flow equals to 9.66 MGD). The total Outfall 001 flow remains the same at 10.86 MGD. Merck recommends that this new analysis be accepted for retaining the Outfall 001 flow at 10.86 MGD and the calculation of mass loadings. The stream modeling for this flow is already complete and has been submitted for your review and approval. OK
- 4) Flow categories: As requested, the Merck wastewater flow has been broken down in the two categories: process wastewater and non-process wastewater. The flows are then

further broken down into the subcategories specific to the pharmaceutical industry. Based on this analysis our non-process wastewater flow is only 17% of the total flow, well below the 25% limit.

- 5) Wastewater Treatment Plant Influent BOD data – Merck has a large amount of wastewater BOD and COD data. Analysis of the historical data shows an excellent correlation between BOD and COD (ratio of 2.33 = COD:BOD). The recent data provided here is a combination of actual and correlation based data, as Merck has reduced the frequency of BOD determinations and increased the reliance on COD for control and optimization of the wastewater treatment plant.
- ✓ DKM

If you have any questions and need additional information in the development of fact sheets please let me know.

Thanks.

Sincerely,

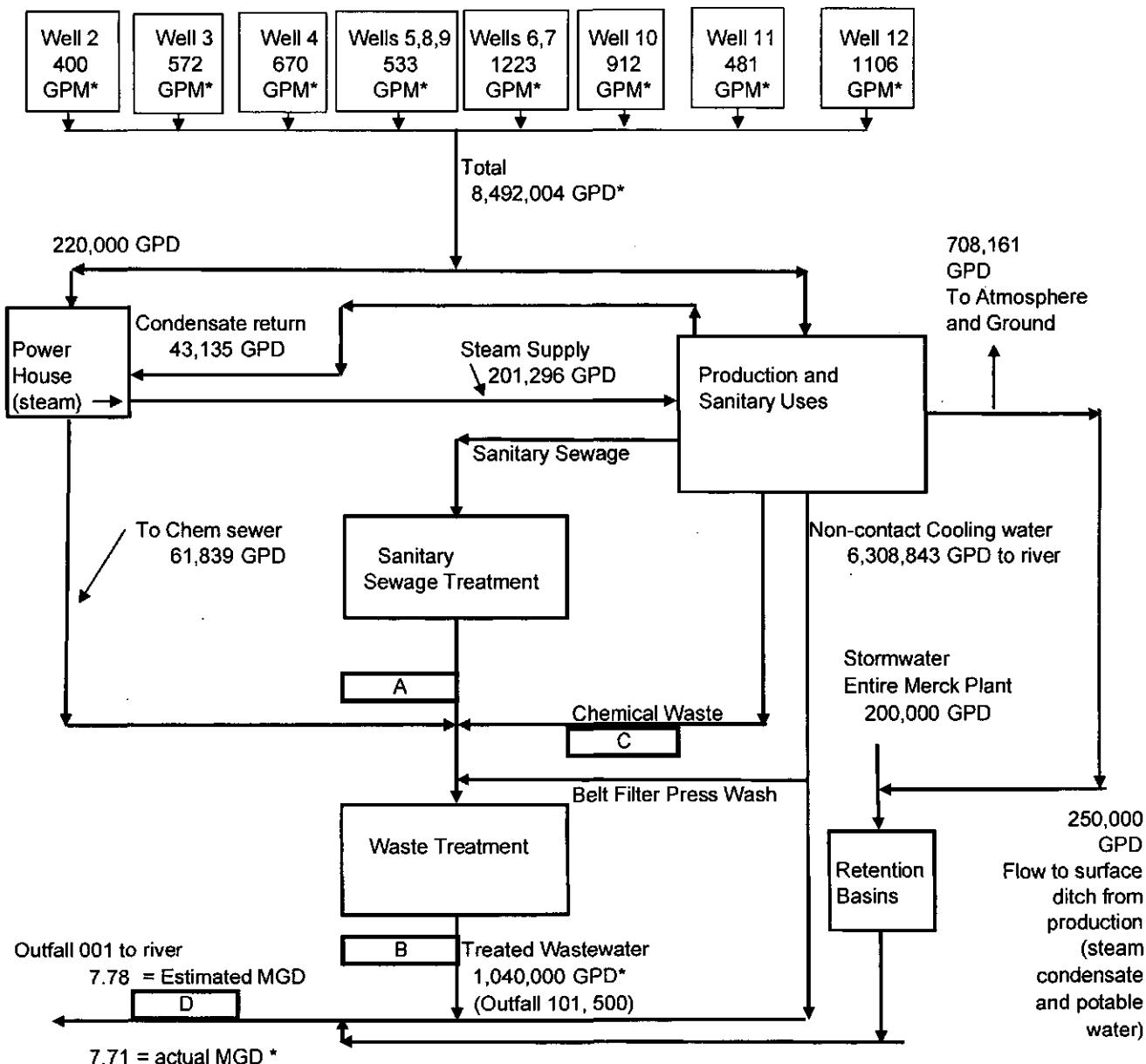


Abhay Kirpekar
Environmental Engineer

Attachments

2010 Water Balance
Attachment 1
Form 2C, Part II.A
Merck - Stonewall Plant Water Balance

Merck Sharp & Dohme Corp.
VA0002178
Update: 1st August 2011



* Basis: Measured flows from Jan. 1, 2010 to Dec. 31, 2010

- Flows:**
- (A) = The design average flow at this location as 0.150 MGD - letter from Merck to DEQ (20-Jan-2004). Average operating flow is 108,000 GPD. This is the monitoring location for TRC-Contact compliance.
 - (B) = Outfall 101. Design average flow mass loading calculation is 1.2 MGD - See Addendum 1.
 - (C) = Flow includes cyanide destruction system (RE516, RE515, RE519, RE520, ST1681) flow.
 - (D) = Outfall 001 = From Addendum 2. Merck identified the 95th percentile well water withdrawl flow over a four year period of the non-contact cooling water and surface ditch as 9.66 MGD. The calculated flow at Outfall 001 is then 10.86 MGD (1.2 + 9.66). This is the monitoring location for TRC-Effluent compliance.

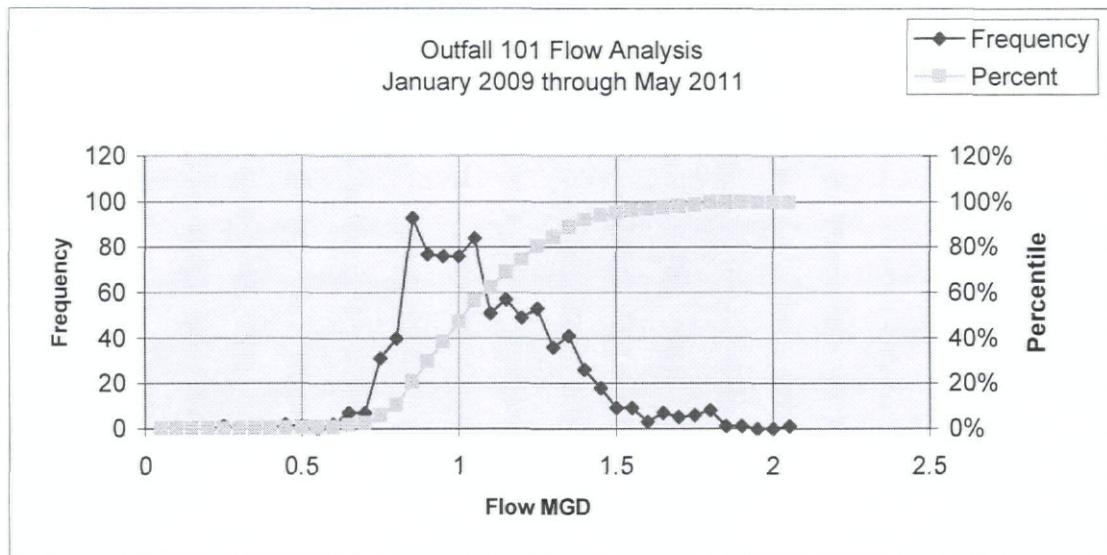
Addendum 1 - Outfall 101 Flow
Jan. 2009 through May 2011

MGD	Frequency	percent	Cumulative percent
0.05	0	0%	0%
0.1	0	0%	0%
0.15	0	0%	0%
0.2	0	0%	0%
0.25	1	0%	0%
0.3	0	0%	0%
0.35	0	0%	0%
0.4	0	0%	0%
0.45	2	0%	0%
0.5	1	0%	0%
0.55	0	0%	0%
0.6	2	0%	1%
0.65	7	1%	1%
0.7	7	1%	2%
0.75	31	4%	6%
0.8	40	5%	10%
0.85	93	11%	21%
0.9	77	9%	30%
0.95	76	9%	38%
1	76	9%	47%
1.05	84	10%	57%
1.1	51	6%	62%
1.15	57	6%	69%
1.2	49	6%	74%
1.25	53	6%	81%
1.3	36	4%	85%
1.35	41	5%	89%
1.4	26	3%	92%
1.45	18	2%	94%
1.5	9	1%	95%
1.55	9	1%	96%
1.6	3	0%	97%
1.65	7	1%	97%
1.7	5	1%	98%
1.75	6	1%	98.7%
1.8	8	1%	99.7%
1.85	1	0%	99.8%
1.9	1	0%	99.9%
1.95	0	0%	99.9%
2	0	0%	99.9%
2.05	1	0%	100.0%
More	1		

Total No. 878 Days

Operating Average flow	1.025	MGD
Design Average flow	1.2	MGD
95% Percentile	1.5	MGD
Max. Design flow	2.1	MGD

Addendum 1 - Continued



Addendum 2
Merck - Well Water Withdrawal Rates

Year	Month	All Production Wells Monthly Average MGD
2007	JAN	8.63
	FEB	7.93
	MAR	7.93
	APR	7.94
	MAY	8.01
	JUN	8.05
	JUL	7.94
	AUG	7.90
	SEP	8.26
	OCT	7.94
	NOV	7.68
	DEC	8.66
2008	JAN	8.47
	FEB	8.81
	MAR	8.89
	APR	8.20
	MAY	7.98
	JUN	7.88
	JUL	8.33
	AUG	8.81
	SEP	8.83
	OCT	8.93
	NOV	9.48
	DEC	9.33
2009	JAN	9.70
	FEB	9.58
	MAR	9.05
	APR	8.75
	MAY	8.73
	JUN	8.12
	JUL	8.45
	AUG	8.10
	SEP	8.12
	OCT	8.43
	NOV	7.96
	DEC	7.81
2010	JAN	8.43
	FEB	8.27
	MAR	7.64
	APR	8.17
	MAY	8.66
	JUN	9.41
	JUL	8.64
	AUG	8.22
	SEP	8.03
	OCT	9.89
	NOV	8.34
	DEC	8.19
		Average
		8.45
		Max
		9.89
		Min
		7.64

Addendum 2 - continued
 Histogram of Well Water Withdrawal

Flow MGD Bin	Frequency	percent	Cumulative	Cum. Percent
7.6	0	0%	0	0%
7.65	1	2%	1	2%
7.7	1	2%	2	4%
7.75	0	0%	2	4%
7.8	0	0%	2	4%
7.85	1	2%	3	6%
7.9	1	2%	4	8%
7.95	6	13%	10	21%
8	2	4%	12	25%
8.05	3	6%	15	31%
8.1	1	2%	16	33%
8.15	2	4%	18	38%
8.2	3	6%	21	44%
8.25	1	2%	22	46%
8.3	2	4%	24	50%
8.35	2	4%	26	54%
8.4	0	0%	26	54%
8.45	3	6%	29	60%
8.5	1	2%	30	63%
8.55	0	0%	30	63%
8.6	0	0%	30	63%
8.65	2	4%	32	67%
8.7	2	4%	34	71%
8.75	1	2%	35	73%
8.8	1	2%	36	75%
8.85	3	6%	39	81%
8.9	1	2%	40	83%
8.95	1	2%	41	85%
9	0	0%	41	85%
9.05	0	0%	41	85%
9.1	1	2%	42	88%
9.15	0	0%	42	88%
9.2	0	0%	42	88%
9.25	0	0%	42	88%
9.3	0	0%	42	88%
9.35	1	2%	43	90%
9.4	0	0%	43	90%
9.45	1	2%	44	92%
9.5	1	2%	45	94%
9.55	0	0%	45	94%
9.6	1	2%	46	96%
9.65	0	0%	46	96%
9.7	1	2%	47	98%
9.75	0	0%	47	98%
9.8	0	0%	47	98%
9.85	0	0%	47	98%
9.9	1	2%	48	100%
9.95	0	0%	48	100%
10	0	0%	48	100%
	0			
sum	48	Months		
95% Percentile flow = 9.575 MGD				
Flow to river = 9.66 MGD Accounting for storms				

Pharmaceutical Manufacturing - Flow Categories

Description	GPD
Process Wastewater Flows to WWTP	
Subcategory A: Fermentation	258,708
Subcategory B: Natural Extraction	
Subcategory C: Chemical Synthesis	474,299
Subcategory D: Formulating, Mixing and Compounding	129,354
Total Process Wastewater Flow	862,361
Non-Process Wastewater Flows to WWTP	
Freshwater to Belt Filter Press	15,000
Power House Demineralization	61,839
Sanitary Wastewater	100,800
Total non-process wastewater flow	177,639
Grand Total (See Attachment 1, Form 2C, Part II A)	1,040,000
% Non-process flow/total WWTP flow	17%

**Merck WWTP Influent Sample
COD and BOD Data**

Sample DATE	COD kg/day	Actual or Predicted BOD kg/day
01/01/05	11816	3106
01/02/05	6955	2240
01/03/05	12797	6596
01/04/05	11691	4622
01/05/05	7722	3492
01/06/05	14886	6544
01/07/05	5633	1761
01/08/05	9187	2724
01/09/05	13226	8499
01/10/05	10447	2874
01/11/05	13320	6311
01/12/05	11773	4328
01/13/05	7363	2654
01/14/05	4457	1821
01/15/05	8074	2812
01/16/05	9768	3937
01/17/05	8473	2298
01/18/05	13620	5114
01/19/05	2249	1150
01/20/05	5595	2422
01/21/05	9337	3860
01/22/05	6998	2747
01/23/05	5630	2322
01/24/05	11542	5231
01/25/05	4834	1968
01/26/05	13466	4760
01/27/05	6811	2785
01/28/05	7812	2318
01/29/05	7258	1588
01/30/05	11374	3649
01/31/05	8308	2901
02/01/05	6077	2568
02/02/05	7486	2988
02/03/05	4547	1812
02/04/05	5412	1930
02/05/05	9839	2928
02/06/05	11248	2925
02/07/05	7864	3739
02/08/05	4429	
02/09/05	5008	1424
02/10/05	8050	2201
02/11/05	9351	5482
02/12/05	6370	1594
02/13/05	6083	1686
02/14/05	9410	2920
02/15/05	6987	2018
02/16/05	7200	2985
02/17/05	9181	7391

**Merck WWTP Influent Sample
COD and BOD Data**

02/18/05	9489	4860
02/19/05	7695	2443
02/20/05	7348	3198
02/21/05	5536	1187
02/22/05	6978	2737
02/23/05	7567	3797
02/24/05	9738	3918
02/25/05	10512	5360
02/26/05	10433	3683
02/27/05	9629	3226
02/28/05	6616	2905
03/01/05	11957	4133
03/02/05	6463	2863
03/03/05	7548	2315
03/04/05	5721	1472
03/05/05	10041	2328
03/06/05	10316	4686
03/07/05	8620	2539
03/08/05	8194	3821
03/09/05	7563	3930
03/10/05	6538	2302
03/11/05	8628	3719
03/12/05	8145	3095
03/13/05	5617	2438
03/14/05	14239	4737
03/15/05	9649	3842
03/16/05	5905	2679
03/17/05	10715	2963
03/18/05	7712	3505
03/19/05	8001	4235
03/20/05	6825	1875
03/21/05	4045	2022
03/22/05	9532	3741
03/23/05	8188	3750
03/24/05	15083	4380
03/25/05	12324	3988
03/26/05	3537	1143
03/27/05	10259	2333
03/28/05	12139	3282
03/29/05	8397	
03/30/05	4944	
03/31/05	8310	4237
04/01/05	12579	5426
04/02/05	5924	2881
04/03/05	8178	2122
04/04/05	10181	3766
04/05/05	4999	1877
04/06/05	10351	3149
04/07/05	10941	5593
04/08/05	7889	3468
04/09/05	5868	3078
04/10/05	8255	3316

**Merck WWTP Influent Sample
COD and BOD Data**

04/11/05	5612	2140
04/12/05	9730	3706
04/13/05	8845	3903
04/14/05	8574	2256
04/15/05	3265	1170
04/16/05	11756	4059
04/17/05	14028	7048
04/18/05	11225	3043
04/19/05	10521	5229
04/20/05	6580	2404
04/21/05	8406	2778
04/22/05	9918	4827
04/23/05	6921	2948
04/24/05	8091	2339
04/25/05	9383	4154
04/26/05	8200	3546
04/27/05	10696	4623
04/28/05	7314	2930
04/29/05	11582	6382
04/30/05	8866	3073
05/01/05	8968	3499
05/02/05	11011	3991
05/03/05	6195	2828
05/04/05	7949	3508
05/05/05	9632	3633
05/06/05	6302	2138
05/07/05	4003	1854
05/08/05	3060	0
05/09/05	8451	5674
05/10/05	6690	5876
05/11/05	5808	5060
05/12/05	9518	4607
05/13/05	10102	2736
05/14/05	7392	3047
05/15/05	7130	3272
05/16/05	6245	1679
05/17/05	6634	2962
05/18/05	11822	6463
05/19/05	14643	7410
05/20/05	7156	3861
05/21/05	11502	3889
05/22/05	6915	2111
05/23/05	7276	2714
05/24/05	6395	1948
05/25/05	5144	1348
05/26/05	11029	3938
05/27/05	7646	3412
05/28/05	5868	2492
05/29/05	5945	2644
05/30/05	8903	4691
05/31/05	33774	16905
06/01/05	6881	3753

**Merck WWTP Influent Sample
COD and BOD Data**

06/02/05	14880	7297
06/03/05	9684	4803
06/04/05	7366	3172
06/05/05	6880	2910
06/06/05	9846	4847
06/07/05	7673	3066
06/08/05	8179	3614
06/09/05	13606	4317
06/10/05	6990	2607
06/11/05	8983	3236
06/12/05	7781	2964
06/13/05	6277	2561
06/14/05	9114	3029
06/15/05	9613	4428
06/16/05	11075	3535
06/17/05	6800	3279
06/18/05	14019	5033
06/19/05	7241	
06/20/05	7843	
06/21/05	9602	3562
06/22/05	7541	2686
06/23/05	3075	1388
06/24/05	6269	2582
06/25/05	5314	
06/26/05	10325	
06/27/05	4926	2946
06/28/05	8474	4633
06/29/05	8802	4448
06/30/05	9145	3389
07/01/05	5672	2709
07/02/05	9383	3624
07/03/05	8863	1918
07/04/05	4324	2040
07/05/05	7486	3175
07/06/05	7268	2576
07/07/05	6365	3593
07/08/05	13719	4797
07/09/05	5431	2430
07/10/05	10500	4993
07/11/05	8587	3964
07/12/05	8636	4156
07/13/05	5791	3299
07/14/05	7049	4224
07/15/05	6723	3523
07/16/05	6129	2598
07/17/05	7784	3242
07/18/05	6262	3003
07/19/05	4247	2474
07/20/05	5350	2776
07/21/05	6528	3539
07/22/05	4869	2491
07/23/05	2252	2040

**Merck WWTP Influent Sample
COD and BOD Data**

07/24/05	2319	1309
07/25/05	4699	2688
07/26/05	3573	1823
07/27/05	3179	1853
07/28/05	3297	
07/29/05	6278	
07/30/05	2206	
07/31/05	1814	1035
08/01/05	4070	1999
08/02/05	3266	1402
08/03/05	2361	875
08/04/05	6316	3610
08/05/05	5266	2419
08/06/05	3840	2462
08/07/05	3825	1917
08/08/05	2228	
08/09/05	4353	1968
08/10/05	2479	1531
08/11/05	11363	2371
08/12/05	12558	2400
08/13/05	3574	1863
08/14/05	3179	1185
08/15/05	7492	3208
08/16/05	3883	2006
08/17/05	5191	5191
08/18/05	8164	4678
08/19/05	10222	4624
08/20/05	3890	2118
08/21/05	4348	2882
08/22/05	7474	3658
08/23/05	5106	5106
08/24/05	5783	2686
08/25/05	4646	2832
08/26/05	8396	8224
08/27/05	2510	1170
08/28/05	4191	2407
08/29/05	5945	3935
08/30/05	9838	5433
08/31/05	11046	
09/01/05	2812	1561
09/02/05	5783	2568
09/03/05	2494	1828
09/04/05	2222	
09/05/05	5837	2009
09/06/05	8301	5470
09/07/05	5257	3237
09/08/05	6816	3163
09/09/05	7377	3234
09/10/05	3776	2212
09/11/05	2335	593
09/12/05	4124	2011
09/13/05	6649	3305

**Merck WWTP Influent Sample
COD and BOD Data**

09/14/05	10615	6146
09/15/05	13796	6291
09/16/05	3983	2184
09/17/05	5839	1278
09/18/05	2773	2155
09/19/05	5926	3444
09/20/05	10262	6149
09/21/05	12834	6053
09/22/05	5757	1884
09/23/05	5153	2444
09/24/05	5276	2736
09/25/05	4197	1576
09/26/05	3827	2290
09/27/05	5748	4042
09/28/05	5742	3327
09/29/05	8430	4945
09/30/05	12813	5832
10/01/05	7654	3152
10/02/05	14001	5987
10/03/05	13232	6527
10/04/05	13970	6363
10/05/05	7440	3844
10/06/05	6685	2526
10/07/05	5527	3026
10/08/05	4960	3651
10/09/05	1534	812
10/10/05	6331	3831
10/11/05	5054	2943
10/12/05	7104	2829
10/13/05	11008	4995
10/14/05	12722	5721
10/15/05	4977	2871
10/16/05	1456	858
10/17/05	12191	8049
10/18/05	10559	6520
10/19/05	7734	4008
10/20/05	12369	5297
10/21/05	15770	10098
10/22/05	11643	5979
10/23/05	3783	2319
10/24/05	7051	4166
10/25/05	11067	5254
10/26/05	4578	2126
10/27/05	5140	2643
10/28/05	7964	3026
10/29/05	2979	1787
10/30/05	8541	4094
10/31/05	10248	5582
11/01/05	6396	2703
11/02/05	3072	1041
11/03/05	7181	3737
11/04/05	4392	2253

**Merck WWTP Influent Sample
COD and BOD Data**

11/05/05	2871	1332
11/06/05	693	
11/07/05	2132	735
11/08/05	5084	2407
11/09/05	6610	2523
11/10/05	16971	7739
11/11/05	11022	4888
11/12/05	3043	2145
11/13/05	4584	2913
11/14/05	12925	6896
11/15/05	6156	4284
11/16/05	5109	2415
11/17/05	6637	3315
11/18/05	11522	5669
11/19/05	7631	4193
11/20/05	5702	2368
11/21/05	7623	4531
11/22/05	5257	3884
11/23/05	4784	3453
11/24/05	3913	2338
11/25/05	4094	2615
11/26/05	3337	2227
11/27/05	4072	2856
11/28/05	6616	4407
11/29/05	5057	2731
11/30/05	1720	912
12/01/05	4587	2887
12/02/05	6600	
12/03/05	1277	636
12/04/05	2114	653
12/05/05	3017	1121
12/06/05	2121	1276
12/07/05	6621	1829
12/08/05	7129	3021
12/09/05	5729	2163
12/10/05	1482	695
12/11/05	862	424
12/12/05	3385	
12/13/05	2294	1303
12/14/05	5057	1694
12/15/05	2507	1126
12/16/05	8561	3015
12/17/05	5825	3333
12/18/05	3991	1422
12/19/05	2495	1041
12/20/05	12678	6517
12/21/05	3998	1801
12/22/05	3073	965
12/23/05	3843	2261
12/24/05	3853	
12/25/05	1151	
12/26/05	1029	418

**Merck WWTP Influent Sample
COD and BOD Data**

12/27/05	445	504
12/28/05	7818	4127
12/29/05	8563	5334
12/30/05	2286	
12/31/05	3128	
01/01/06	582	326
01/02/06	2701	897
01/03/06	4047	1889
01/04/06	8497	3759
01/05/06	11040	4290
01/06/06	7996	2494
01/07/06	2410	1407
01/08/06	7633	3315
01/09/06	4967	1788
01/10/06	9253	4757
01/11/06	12617	5896
01/12/06	15864	8128
01/13/06	11452	4475
01/14/06	4600	1521
01/15/06	3790	1343
01/16/06	11918	4361
01/17/06	9122	5303
01/18/06	8410	3410
01/19/06	3989	1527
01/20/06	12678	3685
01/21/06	5096	5669
01/22/06	3950	3063
01/23/06	6957	3360
01/24/06	8133	5089
01/25/06	6397	2882
01/26/06	9309	3727
01/27/06	8528	2763
01/28/06	2051	489
01/29/06	3653	2514
01/30/06	3706	1674
01/31/06	4536	1567
02/01/06	5598	2289
02/02/06	10462	4530
02/03/06	5475	2532
02/04/06	2319	2304
02/05/06	4506	1273
02/06/06	5855	2891
02/07/06	5469	2871
02/08/06	6295	2899
02/09/06	8434	4632
02/10/06	3008	1751
02/11/06	4069	1152
02/12/06	7375	944
02/13/06	4941	1852
02/14/06	5791	3336
02/15/06	7733	3870
02/16/06	8384	3286

**Merck WWTP Influent Sample
COD and BOD Data**

02/17/06	9677	3794
02/18/06	2986	941
02/19/06	3611	424
02/20/06	4456	1085
02/21/06	14160	
02/22/06	5900	2891
02/23/06	8459	3499
02/24/06	8666	3322
02/25/06	9029	2675
02/26/06	1477	662
02/27/06	2196	1280
02/28/06	2659	1402
03/01/06	5172	2483
03/02/06	8218	3817
03/03/06	7836	2055
03/04/06	3293	626
03/05/06	1899	1078
03/06/06	7106	3971
03/07/06	3628	1724
03/08/06	5281	2871
03/09/06	8972	4346
03/10/06	7952	2762
03/11/06	1891	943
03/12/06	2310	1308
03/13/06	5709	2331
03/14/06	4684	1802
03/15/06	5383	1517
03/16/06	11167	3279
03/17/06	4547	1767
03/18/06	1037	842
03/19/06	1974	626
03/20/06	3610	1956
03/21/06	6412	3957
03/22/06	9538	4260
03/23/06	6008	2475
03/24/06	10482	4695
03/25/06	6958	3790
03/26/06	2949	968
03/27/06	3626	1748
03/28/06	5052	1709
03/29/06	5769	2308
03/30/06	12562	5527
03/31/06	10817	10817
04/01/06	3965	831
04/02/06	2937	693
04/03/06	3725	1719
04/04/06	6787	2450
04/05/06	7828	3598
04/06/06	7676	2504
04/07/06	7068	2463
04/08/06	7162	3673
04/09/06	2590	2176

**Merck WWTP Influent Sample
COD and BOD Data**

04/10/06	3827	1715
04/11/06	5366	3084
04/12/06	5226	1957
04/13/06	10424	4925
04/14/06	6512	2158
04/15/06	3402	1616
04/16/06	2620	1289
04/17/06	5533	2509
04/18/06	8364	3694
04/19/06	9352	4107
04/20/06	5836	2636
04/21/06	10816	4720
04/22/06	3719	1749
04/23/06	1992	1026
04/24/06	1918	995
04/25/06	3114	1496
04/26/06	4673	2148
04/27/06	8372	3697
04/28/06	6287	2824
04/29/06	1457	802
04/30/06	5995	2702
05/01/06	4935	2258
05/02/06	5942	2680
05/03/06	8943	3936
05/04/06	6949	3101
05/05/06	7213	3212
05/06/06	6650	2976
05/07/06	5155	2350
05/08/06	4699	2160
05/09/06	6936	3096
05/10/06	5783	2613
05/11/06	9431	4140
05/12/06	3191	1528
05/13/06	3786	1777
05/14/06	3331	1587
05/15/06	3100	1490
05/16/06	8375	3698
05/17/06	6766	3025
05/18/06	9892	4333
05/19/06	6917	3088
05/20/06	6150	2767
05/21/06	6024	2714
05/22/06	3257	1556
05/23/06	5287	2405
05/24/06	13163	5702
05/25/06	9282	4078
05/26/06	7111	3169
05/27/06	5702	2579
05/28/06	2400	1197
05/29/06	6810	3043
05/30/06	6021	2713
05/31/06	9855	4318

**Merck WWTP Influent Sample
COD and BOD Data**

06/01/06	4122	1918
06/02/06	8129	3595
06/03/06	5280	2403
06/04/06	4835	2216
06/05/06	7411	3295
06/06/06	9625	4221
06/07/06	8269	3654
06/08/06	7362	3274
06/09/06	4047	1886
06/10/06	8425	3719
06/11/06	8130	3596
06/12/06	3303	1575
06/13/06	3963	1851
06/14/06	5484	2488
06/15/06	9264	4070
06/16/06	11527	5018
06/17/06	7012	3128
06/18/06	5995	2702
06/19/06	4881	2236
06/20/06	6044	2723
06/21/06	6184	2781
06/22/06	3886	1819
06/23/06	3140	1507
06/24/06	7142	3182
06/25/06	7083	3157
06/26/06	10551	4609
06/27/06	8412	3714
06/28/06	10420	4554
06/29/06	6677	2987
06/30/06	3776	1773
07/01/06	5911	2667
07/02/06	6922	3090
07/03/06	5156	2351
07/04/06	7315	3254
07/05/06	8743	3852
07/06/06	5364	2438
07/07/06	10381	4538
07/08/06	6262	2814
07/09/06	7419	3298
07/10/06	10439	4562
07/11/06	9780	4286
07/12/06	8524	3760
07/13/06	7854	3480
07/14/06	7135	3179
07/15/06	6222	2797
07/16/06	7853	3480
07/17/06	5764	2605
07/18/06	5120	2336
07/19/06	7028	3134
07/20/06	9593	4208
07/21/06	5571	2524
07/22/06	4384	2028

**Merck WWTP Influent Sample
COD and BOD Data**

07/23/06	8035	3556
07/24/06	7641	3391
07/25/06	4059	1892
07/26/06	4957	2268
07/27/06	9392	4124
07/28/06	5189	2364
07/29/06	5238	2385
07/30/06	8414	3715
07/31/06	9675	4242
08/01/06	5446	2472
08/02/06	10980	4788
08/03/06	5685	2572
08/04/06	4133	1923
08/05/06	7820	3466
08/06/06	6089	2741
08/07/06	6911	3086
08/08/06	4440	2051
08/09/06	6592	2952
08/10/06	7614	3379
08/11/06	5443	2471
08/12/06	2581	1273
08/13/06	2065	1057
08/14/06	7538	3348
08/15/06	8179	3616
08/16/06	17986	7722
08/17/06	6478	2904
08/18/06	7526	3343
08/19/06	7666	3401
08/20/06	4295	1990
08/21/06	8076	3573
08/22/06	12229	5311
08/23/06	9558	4193
08/24/06	5238	2385
08/25/06	5028	2297
08/26/06	5416	2460
08/27/06	5907	2665
08/28/06	5297	2410
08/29/06	10669	4658
08/30/06	12042	5233
08/31/06	2255	1136
09/01/06	1309	740
09/02/06	2014	1036
09/03/06	1930	1000
09/04/06	1741	921
09/05/06	1576	852
09/06/06	4402	2035
09/07/06	1506	823
09/08/06	3061	1474
09/09/06	5433	2467
09/10/06	10871	4743
09/11/06	13556	5867
09/12/06	10638	4645

**Merck WWTP Influent Sample
COD and BOD Data**

09/13/06	5875	2652
09/14/06	5958	2686
09/15/06	7111	3169
09/16/06	5390	2449
09/17/06	6218	2795
09/18/06	8309	3671
09/19/06	4989	2281
09/20/06	10139	4436
09/21/06	5181	2361
09/22/06	5096	2326
09/23/06	5900	2662
09/24/06	4216	1957
09/25/06	6545	2932
09/26/06	9279	4076
09/27/06	9560	4194
09/28/06	5461	2478
09/29/06	13200	5718
09/30/06	9896	4335
10/01/06	8251	3647
10/02/06	14466	6248
10/03/06	5989	2699
10/04/06	3477	1648
10/05/06	7844	3476
10/06/06	5123	2337
10/07/06	3735	1756
10/08/06	2115	1078
10/09/06	9493	4166
10/10/06	7022	3132
10/11/06	6038	2720
10/12/06	7358	3272
10/13/06	9989	4374
10/14/06	10922	4764
10/15/06	14871	6418
10/16/06	8948	3938
10/17/06	3828	1795
10/18/06	10565	4615
10/19/06	10586	4624
10/20/06	4305	1995
10/21/06	6129	2758
10/22/06	8260	3650
10/23/06	6096	2744
10/24/06	6176	2778
10/25/06	7378	3281
10/26/06	16598	7140
10/27/06	8901	3918
10/28/06	6501	2914
10/29/06	2483	1232
10/30/06	2910	1411
10/31/06	6379	2863
11/01/06	6500	2913
11/02/06	5184	2362
11/03/06	9416	4134

**Merck WWTP Influent Sample
COD and BOD Data**

11/04/06	8806	3879
11/05/06	26309	11206
11/06/06	9293	4082
11/07/06	5274	2400
11/08/06	3715	1747
11/09/06	4671	2148
11/10/06	9663	4237
11/11/06	5787	2615
11/12/06	4887	2238
11/13/06	7614	3380
11/14/06	5451	2474
11/15/06	8044	3560
11/16/06	9400	4127
11/17/06	7864	3484
11/18/06	2861	1390
11/19/06	3378	1606
11/20/06	5532	2508
11/21/06	5511	2499
11/22/06	3538	1673
11/23/06	7157	3189
11/24/06	3732	1755
11/25/06	2618	1288
11/26/06	3338	1590
11/27/06	9842	4312
11/28/06	7139	3181
11/29/06	5761	2604
11/30/06	8981	3952
12/01/06	1999	1029
12/02/06	2867	1392
12/03/06	6723	3007
12/04/06	8024	3551
12/05/06	3907	1828
12/06/06	5614	2543
12/07/06	5324	2421
12/08/06	4523	2086
12/09/06	3460	1641
12/10/06	10304	4506
12/11/06	7678	3407
12/12/06	5438	2469
12/13/06	11698	5089
12/14/06	5559	2520
12/15/06	6732	3011
12/16/06	6266	2815
12/17/06	6825	3049
12/18/06	6618	2963
12/19/06	11644	5067
12/20/06	5346	2430
12/21/06	5763	2605
12/22/06	14173	6125
12/23/06	4093	1906
12/24/06	3466	1643
12/25/06	780	519

**Merck WWTP Influent Sample
COD and BOD Data**

12/26/06	2462	1223
12/27/06	3368	1602
12/28/06	7241	3224
12/29/06	7943	3518
12/30/06	2907	1409
12/31/06	2965	1433
01/01/07	3198	1531
01/02/07	3288	1569
01/03/07	15899	6848
01/04/07	8331	3680
01/05/07	21545	9211
01/06/07	3878	1816
01/07/07	11440	4981
01/08/07	12958	5617
01/09/07	11341	4940
01/10/07	11234	4895
01/11/07	15517	6688
01/12/07	7461	3315
01/13/07	12173	5288
01/14/07	5875	2652
01/15/07	4802	2203
01/16/07	10120	4429
01/17/07	10094	4418
01/18/07	2827	1376
01/19/07	3435	1630
01/20/07	3569	1686
01/21/07	12911	5597
01/22/07	10993	4794
01/23/07	9692	4249
01/24/07	8713	3840
01/25/07	5917	2669
01/26/07	9469	4156
01/27/07	7045	3141
01/28/07	5919	2670
01/29/07	12517	5432
01/30/07	12223	5309
01/31/07	6458	2896
02/01/07	9116	4008
02/02/07	7579	3365
02/03/07	6432	2885
02/04/07	8960	3943
02/05/07	12510	5429
02/06/07	3126	1501
02/07/07	13994	6050
02/08/07	11248	4901
02/09/07	6415	2878
02/10/07	718	493
02/11/07	2449	1217
02/12/07	1434	793
02/13/07	169	263
02/14/07	89	230
02/15/07	44	211

**Merck WWTP Influent Sample
COD and BOD Data**

02/16/07	0	192
02/17/07	38	208
02/18/07	29	205
02/19/07	45	211
02/20/07	8227	3636
02/21/07	3942	1843
02/22/07	3259	1557
02/23/07	7825	3468
02/24/07	3302	1574
02/25/07	3390	1611
02/26/07	835	542
02/27/07	5412	2458
02/28/07	8369	3696
03/01/07	9581	4203
03/02/07	10272	4493
03/03/07	7459	3315
03/04/07	4671	2147
03/05/07	11023	4807
03/06/07	10685	4665
03/07/07	4834	2216
03/08/07	5072	2315
03/09/07	16571	7129
03/10/07	4665	2145
03/11/07	7069	3151
03/12/07	5385	2446
03/13/07	3883	1818
03/14/07	9873	4325
03/15/07	6600	2955
03/16/07	14705	6348
03/17/07	4314	1998
03/18/07	4072	1897
03/19/07	794	525
03/20/07	1437	794
03/21/07	9617	4218
03/22/07	22147	9463
03/23/07	9181	4036
03/24/07	7959	3524
03/25/07	5981	2696
03/26/07	4809	2206
03/27/07	8509	3754
03/28/07	10991	4793
03/29/07	13529	5856
03/30/07	6498	2912
03/31/07	11189	4876
04/01/07	8323	3677
04/02/07	12463	5409
04/03/07	5720	2587
04/04/07	11945	5193
04/05/07	11838	5148
04/06/07	4522	2085
04/07/07	6232	2801
04/08/07	7258	3231

**Merck WWTP Influent Sample
COD and BOD Data**

04/09/07	7972	3530
04/10/07	3766	1769
04/11/07	4876	2234
04/12/07	11439	4981
04/13/07	5961	2688
04/14/07	3963	1851
04/15/07	5542	2512
04/16/07	8489	3746
04/17/07	5623	2546
04/18/07	5671	2566
04/19/07	6482	2906
04/20/07	10247	4482
04/21/07	5923	2672
04/22/07	5132	2341
04/23/07	8419	3717
04/24/07	7131	3177
04/25/07	12619	5475
04/26/07	6303	2831
04/27/07	6667	2983
04/28/07	2838	1380
04/29/07	10326	4515
04/30/07	8612	3798
05/01/07	4030	1879
05/02/07	6309	2833
05/03/07	8034	3555
05/04/07	11786	5126
05/05/07	5587	2531
05/06/07	8030	3554
05/07/07	6866	3067
05/08/07	7466	3318
05/09/07	5917	2669
05/10/07	10998	4796
05/11/07	7056	3146
05/12/07	9005	3962
05/13/07	7257	3230
05/14/07	17468	7505
05/15/07	6207	2791
05/16/07	4009	1871
05/17/07	2405	1199
05/18/07	5610	2541
05/19/07	5415	2459
05/20/07	3537	1673
05/21/07	8909	3922
05/22/07	7800	3458
05/23/07	13822	5978
05/24/07	4471	2064
05/25/07	3165	1517
05/26/07	4520	2084
05/27/07	6222	2797
05/28/07	6945	3099
05/29/07	4996	2284
05/30/07	4234	1965

**Merck WWTP Influent Sample
COD and BOD Data**

05/31/07	5713	2584
06/01/07	7011	3127
06/02/07	3344	1592
06/03/07	2345	1174
06/04/07	2450	1218
06/05/07	4122	1918
06/06/07	2564	1266
06/07/07	6293	2826
06/08/07	5367	2439
06/09/07	5033	2299
06/10/07	9089	3997
06/11/07	2786	1359
06/12/07	6835	3053
06/13/07	3423	1625
06/14/07	2269	1142
06/15/07	7548	3352
06/16/07	6856	3062
06/17/07	4595	2116
06/18/07	6740	3014
06/19/07	9538	4185
06/20/07	2889	1402
06/21/07	4076	1899
06/22/07	5092	2324
06/23/07	5378	2444
06/24/07	2035	1044
06/25/07	3331	1587
06/26/07	3077	1480
06/27/07	10689	4667
06/28/07	2989	1443
06/29/07	7080	3156
06/30/07	5920	2670
07/01/07	6597	2954
07/02/07	3409	1619
07/03/07	1180	686
07/04/07	2835	1379
07/05/07	3696	1740
07/06/07	1385	772
07/07/07	3030	1461
07/08/07	2550	1260
07/09/07	9700	4253
07/10/07	6187	2782
07/11/07	4988	2280
07/12/07	4912	2248
07/13/07	3023	1458
07/14/07	3870	1812
07/15/07	1173	684
07/16/07	3740	1758
07/17/07	2906	1409
07/18/07	7276	3238
07/19/07	9332	4099
07/20/07	15587	6717
07/21/07	14820	6396

**Merck WWTP Influent Sample
COD and BOD Data**

07/22/07	3328	1585
07/23/07	2961	1432
07/24/07	3741	1759
07/25/07	13128	5688
07/26/07	9749	4273
07/27/07	3402	1616
07/28/07	2234	1127
07/29/07	3540	1674
07/30/07	5004	2287
07/31/07	4994	2283
08/01/07	4497	2075
08/02/07	6755	3020
08/03/07	1973	1018
08/04/07	2169	1100
08/05/07	10346	4523
08/06/07	4814	2207
08/07/07	4119	1917
08/08/07	3116	1497
08/09/07	6376	2861
08/10/07	3152	1512
08/11/07	1962	1014
08/12/07	1998	1029
08/13/07	8331	3680
08/14/07	10128	4432
08/15/07	8627	3804
08/16/07	5595	2534
08/17/07	2305	1157
08/18/07	3130	1502
08/19/07	9996	4377
08/20/07	2649	1301
08/21/07	5512	2500
08/22/07	6086	2740
08/23/07	7869	3486
08/24/07	4737	2175
08/25/07	5648	2556
08/26/07	5493	2492
08/27/07	3646	1718
08/28/07	11216	4887
08/29/07	3995	1865
08/30/07	10446	4565
08/31/07	11605	5050
09/01/07	5632	2550
09/02/07	1610	866
09/03/07	1029	623
09/04/07	2409	1201
09/05/07	6017	2711
09/06/07	8816	3883
09/07/07	11616	5055
09/08/07	9504	4171
09/09/07	12439	5399
09/10/07	5640	2553
09/11/07	14112	6100

**Merck WWTP Influent Sample
COD and BOD Data**

09/12/07	8453	3731
09/13/07	5164	2354
09/14/07	8036	3556
09/15/07	7855	3480
09/16/07	9920	4345
09/17/07	8632	3806
09/18/07	6038	2720
09/19/07	6399	2871
09/20/07	11859	5157
09/21/07	7562	3358
09/22/07	5808	2624
09/23/07	4467	2062
09/24/07	4845	2221
09/25/07	11584	5041
09/26/07	12942	5610
09/27/07	8716	3841
09/28/07	10204	4464
09/29/07	7819	3466
09/30/07	4762	2186
10/01/07	2515	1245
10/02/07	8230	3637
10/03/07	4875	2233
10/04/07	6159	2771
10/05/07	9306	4088
10/06/07	2062	1056
10/07/07	3270	1561
10/08/07	5729	2591
10/09/07	8341	3684
10/10/07	14421	6229
10/11/07	16361	7041
10/12/07	8743	3852
10/13/07	4655	2141
10/14/07	2750	1344
10/15/07	6341	2847
10/16/07	6108	2749
10/17/07	4665	2145
10/18/07	7314	3254
10/19/07	15238	6571
10/20/07	981	603
10/21/07	2455	1220
10/22/07	1307	739
10/23/07	1929	1000
10/24/07	2500	1239
10/25/07	5707	2581
10/26/07	7414	3296
10/27/07	10805	4716
10/28/07	6981	3115
10/29/07	7387	3285
10/30/07	4960	2269
10/31/07	2833	1378
11/01/07	7062	3148
11/02/07	7317	3255

**Merck WWTP Influent Sample
COD and BOD Data**

11/03/07	4292	1989
11/04/07	7030	3135
11/05/07	3655	1722
11/06/07	6141	2763
11/07/07	9339	4102
11/08/07	7177	3197
11/09/07	5363	2437
11/10/07	4889	2239
11/11/07	2869	1393
11/12/07	6507	2916
11/13/07	4045	1886
11/14/07	2802	1365
11/15/07	4599	2117
11/16/07	2434	1211
11/17/07	5955	2685
11/18/07	10980	4789
11/19/07	2801	1365
11/20/07	3203	1533
11/21/07	5182	2362
11/22/07	1441	796
11/23/07	8394	3706
11/24/07	5559	2520
11/25/07	2542	1256
11/26/07	4458	2058
11/27/07	2268	1142
11/28/07	1923	997
11/29/07	3947	1845
11/30/07	2044	1048
12/01/07	3068	1477
12/02/07	5132	2341
12/03/07	2472	1227
12/04/07	3333	1588
12/05/07	3407	1618
12/06/07	5378	2444
12/07/07	6223	2797
12/08/07	12295	5339
12/09/07	7865	3485
12/10/07	11487	5001
12/11/07	9777	4285
12/12/07	6571	2943
12/13/07	6589	2950
12/14/07	8553	3773
12/15/07	4769	2189
12/16/07	6534	2928
12/17/07	3331	1587
12/18/07	49	213
12/19/07	2773	1353
12/20/07	2460	1222
12/21/07	2213	1119
12/22/07	3914	1831
12/23/07	6666	2983
12/24/07	2145	1090

**Merck WWTP Influent Sample
COD and BOD Data**

12/25/07	1623	872
12/26/07	4150	1930
12/27/07	6850	3060
12/28/07	14614	6310
12/29/07	17803	7645
12/30/07	13527	5855
12/31/07	10336	4519
01/01/08	7690	3411
01/02/08	17530	7531
01/03/08	8766	3862
01/04/08	14355	6201
01/05/08	13841	5986
01/06/08	11794	5129
01/07/08	13129	5688
01/08/08	15905	6850
01/09/08	14444	6239
01/10/08	259	301
01/11/08	14392	6217
01/12/08	7479	3323
01/13/08	4215	1957
01/14/08	4961	2269
01/15/08	6890	3076
01/16/08	9443	4145
01/17/08	7344	3267
01/18/08	4543	2094
01/19/08	3823	1793
01/20/08	10537	4603
01/21/08	4274	1982
01/22/08	9524	4179
01/23/08	9467	4155
01/24/08	19709	8443
01/25/08	9479	4160
01/26/08	6708	3000
01/27/08	3293	1571
01/28/08	3669	1728
01/29/08	3227	1543
01/30/08	3980	1859
01/31/08	10317	4511
02/01/08	7316	3255
02/02/08	4981	2277
02/03/08	5979	2695
02/04/08	8943	3936
02/05/08	8584	3786
02/06/08	10550	4609
02/07/08	15754	6787
02/08/08	14595	6302
02/09/08	2631	1294
02/10/08	6513	2919
02/11/08	7953	3522
02/12/08	5465	2480
02/13/08	3609	1703
02/14/08	3420	1624

**Merck WWTP Influent Sample
COD and BOD Data**

02/15/08	5305	2413
02/16/08	5602	2537
02/17/08	7908	3503
02/18/08	4541	2093
02/19/08	7332	3262
02/20/08	14069	6082
02/21/08	12324	5351
02/22/08	5445	2472
02/23/08	8088	3578
02/24/08	7864	3484
02/25/08	7142	3182
02/26/08	10742	4689
02/27/08	12515	5431
02/28/08	19716	8446
02/29/08	7316	3255
03/01/08	8025	3552
03/02/08	10320	4512
03/03/08	15138	6529
03/04/08	22925	9789
03/05/08	16862	7251
03/06/08	3217	1539
03/07/08	4802	2203
03/08/08	6161	2771
03/09/08	11270	4910
03/10/08	7239	3222
03/11/08	11084	4832
03/12/08	12710	5513
03/13/08	5847	2640
03/14/08	9730	4266
03/15/08	7815	3464
03/16/08	9005	3962
03/17/08	10685	4665
03/18/08	8954	3941
03/19/08	18364	7880
03/20/08	7520	3340
03/21/08	6839	3055
03/22/08	2653	1303
03/23/08	6200	2788
03/24/08	12861	5576
03/25/08	13337	5775
03/26/08	8543	3768
03/27/08	6104	2747
03/28/08	10741	4689
03/29/08	8746	3854
03/30/08	3788	1778
03/31/08	4890	2239
04/01/08	9648	4231
04/02/08	12773	5539
04/03/08	19400	8313
04/04/08	10377	4536
04/05/08	7565	3359
04/06/08	5843	2638

**Merck WWTP Influent Sample
COD and BOD Data**

04/07/08	16854	7248
04/08/08	15657	6747
04/09/08	5456	2476
04/10/08	4684	2153
04/11/08	6667	2983
04/12/08	2274	1144
04/13/08	5782	2613
04/14/08	6197	2787
04/15/08	11895	5172
04/16/08	10712	4676
04/17/08	3604	1701
04/18/08	5026	2296
04/19/08	2969	1435
04/20/08	4034	1881
04/21/08	7273	3237
04/22/08	7177	3197
04/23/08	2981	1440
04/24/08	6064	2731
04/25/08	1541	838
04/26/08	6629	2967
04/27/08	5173	2358
04/28/08	5473	2483
04/29/08	5351	2432
04/30/08	7184	3200
05/01/08	8073	3572
05/02/08	11389	4960
05/03/08	8615	3799
05/04/08	6756	3021
05/05/08	3590	1695
05/06/08	9265	4071
05/07/08	9933	4351
05/08/08	7991	3537
05/09/08	9363	4112
05/10/08	5357	2435
05/11/08	9836	4310
05/12/08	11221	4889
05/13/08	12637	5482
05/14/08	17542	7535
05/15/08	17595	7558
05/16/08	8858	3900
05/17/08	7498	3331
05/18/08	8539	3767
05/19/08	14397	6219
05/20/08	8145	3602
05/21/08	12537	5441
05/22/08	13476	5834
05/23/08	7341	3265
05/24/08	11272	4911
05/25/08	7200	3206
05/26/08	4905	2246
05/27/08	7849	3478
05/28/08	11731	5103

**Merck WWTP Influent Sample
COD and BOD Data**

05/29/08	20787	8894
05/30/08	14256	6160
05/31/08	9412	4132
06/01/08	5478	2486
06/02/08	9024	3970
06/03/08	4849	2222
06/04/08	9804	4296
06/05/08	10945	4774
06/06/08	9216	4050
06/07/08	11815	5138
06/08/08	5461	2479
06/09/08	11598	5047
06/10/08	7959	3524
06/11/08	14061	6078
06/12/08	10338	4520
06/13/08	3799	1783
06/14/08	4132	1922
06/15/08	2935	1421
06/16/08	4099	1908
06/17/08	4221	1959
06/18/08	3606	1702
06/19/08	5606	2539
06/20/08	3386	1610
06/21/08	2909	1410
06/22/08	2649	1301
06/23/08	5711	2583
06/24/08	5210	2373
06/25/08	14732	6359
06/26/08	6242	2805
06/27/08	2949	1427
06/28/08	1630	875
06/29/08	4083	1902
06/30/08	6177	2778
07/01/08	2585	1274
07/02/08	1847	965
07/03/08	2964	1433
07/04/08	1104	655
07/05/08	2012	1034
07/06/08	6870	3068
07/07/08	7500	3332
07/08/08	6709	3001
07/09/08	10191	4458
07/10/08	3081	1482
07/11/08	2317	1162
07/12/08	3027	1459
07/13/08	2804	1366
07/14/08	15069	6500
07/15/08	3682	1734
07/16/08	2273	1144
07/17/08	4725	2170
07/18/08	1508	824
07/19/08	3595	1697

START (DAWN)

Merck WWTP Influent Sample
COD and BOD Data

07/20/08	2128	1083
07/21/08	4005	1869
07/22/08	1683	897
07/23/08	3079	1481
07/24/08	2196	1112
07/25/08	1361	762
07/26/08	2706	1325
07/27/08	470	389
07/28/08	1873	976
07/29/08	1776	936
07/30/08	9054	3982
07/31/08	2186	1107
08/01/08	4292	1989
08/02/08	734	500
08/03/08	1154	676
08/04/08	2578	1271
08/05/08	12587	5461
08/06/08	2815	1371
08/07/08	6092	2742
08/08/08	4608	2121
08/09/08	10805	4716
08/10/08	4037	1882
08/11/08	2804	1366
08/12/08	5082	2320
08/13/08	9663	4237
08/14/08	5147	2347
08/15/08	8670	3822
08/16/08	3740	1758
08/17/08	1579	853
08/18/08	2150	1093
08/19/08	9216	4050
08/20/08	3102	1491
08/21/08	3629	1711
08/22/08	2227	1125
08/23/08	2522	1248
08/24/08	7619	3382
08/25/08	12401	5384
08/26/08	7371	3278
08/27/08	15195	6553
08/28/08	9936	4351
08/29/08	4813	2207
08/30/08	6781	3031
08/31/08	4646	2137
09/01/08	3656	1723
09/02/08	2161	1097
09/03/08	6133	2760
09/04/08	3458	1640
09/05/08	2235	1128
09/06/08	3548	1678
09/07/08	915	575
09/08/08	5790	2616
09/09/08	6597	2954

**Merck WWTP Influent Sample
COD and BOD Data**

09/10/08	11380	4956
09/11/08	8974	3949
09/12/08	5406	2455
09/13/08	2512	1244
09/14/08	4510	2080
09/15/08	4108	1912
09/16/08	6868	3067
09/17/08	8602	3793
09/18/08	7185	3200
09/19/08	3407	1619
09/20/08	4318	2000
09/21/08	4794	2199
09/22/08	8529	3762
09/23/08	9956	4360
09/24/08	4476	2066
09/25/08	17216	7399
09/26/08	15758	6789
09/27/08	4471	2064
09/28/08	2722	1332
09/29/08	9235	4058
09/30/08	5807	2623
10/01/08	7133	3178
10/02/08	5142	2345
10/03/08	4130	1921
10/04/08	3008	1451
10/05/08	8178	3616
10/06/08	7411	3295
10/07/08	3404	1617
10/08/08	8675	3824
10/09/08	24934	10630
10/10/08	8195	3623
10/11/08	3593	1696
10/12/08	3005	1450
10/13/08	9081	3994
10/14/08	13851	5991
10/15/08	4960	2269
10/16/08	13581	5878
10/17/08	5846	2640
10/18/08	3675	1731
10/19/08	4644	2136
10/20/08	13133	5690
10/21/08	5292	2407
10/22/08	16220	6982
10/23/08	23511	10034
10/24/08	16251	6995
10/25/08	4531	2089
10/26/08	14151	6116
10/27/08	8708	3838
10/28/08	9120	4010
10/29/08	10833	4727
10/30/08	3807	1786
10/31/08	2854	1387

**Merck WWTP Influent Sample
COD and BOD Data**

11/01/08	3056	1472
11/02/08	3802	1784
11/03/08	10305	4506
11/04/08	7374	3279
11/05/08	18963	8130
11/06/08	4464	2061
11/07/08	4196	1949
11/08/08	1550	841
11/09/08	4701	2160
11/10/08	7820	3466
11/11/08	8309	3671
11/12/08	18739	8037
11/13/08	10810	4718
11/14/08	4046	1886
11/15/08	285	312
11/16/08	6984	3116
11/17/08	3398	1615
11/18/08	6003	2705
11/19/08	5719	2586
11/20/08	11106	4841
11/21/08	8775	3866
11/22/08	9106	4004
11/23/08	13851	5991
11/24/08	19370	8301
11/25/08	15041	6488
11/26/08	6558	2938
11/27/08	582	436
11/28/08	4829	2214
11/29/08	5393	2450
11/30/08	3731	1754
12/01/08	6644	2974
12/02/08	4665	2145
12/03/08	11518	5014
12/04/08	8835	3891
12/05/08	9347	4105
12/06/08	7169	3193
12/07/08	3903	1826
12/08/08	10610	4634
12/09/08	22450	9590
12/10/08	9493	4166
12/11/08	10107	4423
12/12/08	3134	1504
12/13/08	4224	1961
12/14/08	6296	2828
12/15/08	8344	3685
12/16/08	8397	3707
12/17/08	6396	2870
12/18/08	3529	1670
12/19/08	4671	2148
12/20/08	9230	4056
12/21/08	4797	2201
12/22/08	2863	1391

Merck WWTP Influent Sample
COD and BOD Data

12/23/08	536	417
12/24/08	709	489
12/25/08	246	295
12/26/08	1558	845
12/27/08	1697	903
12/28/08	1907	991
12/29/08	1761	929
12/30/08	2809	1368
12/31/08	5335	2426
01/01/09	8206	3628
01/02/09	3837	1798
01/03/09	2181	1105
01/04/09	5305	2413
01/05/09	5693	2576
01/06/09	5663	2563
01/07/09	7151	3186
01/08/09	11998	5215
01/09/09	4037	1882
01/10/09	3762	1767
01/11/09	5441	2470
01/12/09	4619	2126
01/13/09	2345	1174
01/14/09	4834	2216
01/15/09	4374	2023
01/16/09	339	334
01/17/09	3320	1582
01/18/09	2960	1431
01/19/09	6571	2943
01/20/09	7504	3333
01/21/09	7877	3490
01/22/09	14895	6428
01/23/09	6835	3054
01/24/09	2538	1255
01/25/09	5277	2401
01/26/09	8460	3734
01/27/09	9105	4004
01/28/09	9050	3981
01/29/09	6488	2908
01/30/09	6959	3105
01/31/09	6757	3021
02/01/09	3857	1807
02/02/09	5623	2546
02/03/09	3224	1542
02/04/09	12282	5334
02/05/09	10498	4587
02/06/09	4157	1933
02/07/09	13075	5666
02/08/09	14961	6455
02/09/09	17052	7331
02/10/09	18427	7906
02/11/09	14272	6167
02/12/09	10779	4705

**Merck WWTP Influent Sample
COD and BOD Data**

02/13/09	10906	4758
02/14/09	8740	3851
02/15/09	12790	5546
02/16/09	25318	10791
02/17/09	6006	2707
02/18/09	5108	2330
02/19/09	5688	2574
02/20/09	2049	1050
02/21/09	1977	1020
02/22/09	1928	999
02/23/09	3763	1768
02/24/09	6804	3041
02/25/09	5222	2378
02/26/09	4615	2124
02/27/09	3933	1839
02/28/09	2423	1207
03/01/09	5040	2302
03/02/09	5318	2419
03/03/09	3655	1722
03/04/09	5272	2399
03/05/09	1947	1007
03/06/09	10013	4384
03/07/09	3227	1543
03/08/09	10901	4756
03/09/09	2306	1158
03/10/09	3492	1654
03/11/09	4342	2010
03/12/09	9326	4096
03/13/09	11051	4818
03/14/09	6106	2749
03/15/09	7264	3233
03/16/09	7181	3198
03/17/09	4240	1967
03/18/09	4758	2184
03/19/09	6821	3048
03/20/09	3393	1613
03/21/09	5257	2393
03/22/09	2872	1395
03/23/09	3026	1459
03/24/09	4090	1905
03/25/09	3713	1747
03/26/09	12824	5560
03/27/09	5644	2555
03/28/09	5651	2558
03/29/09	3651	1721
03/30/09	4378	2025
03/31/09	9613	4216
04/01/09	7005	3125
04/02/09	5275	2401
04/03/09	1768	932
04/04/09	1599	862
04/05/09	3483	1650

**Merck WWTP Influent Sample
COD and BOD Data**

04/06/09	1414	784
04/07/09	2922	1415
04/08/09	3327	1585
04/09/09	4766	2187
04/10/09	5394	2450
04/11/09	3706	1744
04/12/09	9176	4034
04/13/09	3271	1562
04/14/09	6315	2836
04/15/09	3937	1840
04/16/09	8126	3594
04/17/09	2096	1070
04/18/09	2948	1426
04/19/09	3044	1466
04/20/09	5652	2558
04/21/09	9054	3982
04/22/09	7606	3376
04/23/09	3671	1729
04/24/09	2231	1126
04/25/09	6036	2719
04/26/09	4552	2098
04/27/09	4463	2061
04/28/09	2334	1169
04/29/09	3596	1698
04/30/09	4779	2193
05/01/09	1766	932
05/02/09	4933	2257
05/03/09	6155	2769
05/04/09	3333	1588
05/05/09	9955	4360
05/06/09	14012	6058
05/07/09	6546	2933
05/08/09	2348	1175
05/09/09	9211	4048
05/10/09	6181	2780
05/11/09	7075	3154
05/12/09	5028	2297
05/13/09	6843	3057
05/14/09	8007	3544
05/15/09	2026	1040
05/16/09	2697	1321
05/17/09	6253	2810
05/18/09	1727	915
05/19/09	4777	2192
05/20/09	4153	1931
05/21/09	2873	1395
05/22/09	2625	1291
05/23/09	3036	1463
05/24/09	683	478
05/25/09	7289	3244
05/26/09	5978	2695
05/27/09	8656	3816

**Merck WWTP Influent Sample
COD and BOD Data**

05/28/09	9435	4142
05/29/09	4112	1914
05/30/09	2843	1382
05/31/09	2796	1363
06/01/09	306	321
06/02/09	2096	1070
06/03/09	1295	734
06/04/09	1931	1000
06/05/09	2513	1244
06/06/09	3228	1544
06/07/09	8199	3624
06/08/09	5348	2431
06/09/09	13860	5994
06/10/09	3218	1539
06/11/09	5323	2421
06/12/09	280	310
06/13/09	1737	919
06/14/09	4144	1927
06/15/09	1660	887
06/16/09	535	416
06/17/09	6762	3023
06/18/09	6470	2901
06/19/09	8859	3901
06/20/09	8818	3883
06/21/09	9341	4102
06/22/09	10062	4405
06/23/09	5669	2566
06/24/09	12015	5222
06/25/09	12212	5304
06/26/09	1998	1029
06/27/09	3388	1610
06/28/09	6677	2987
06/29/09	6765	3024
06/30/09	5072	2316
07/01/09	3423	1625
07/02/09	4807	2205
07/03/09	2045	1048
07/04/09	2927	1418
07/05/09	3600	1699
07/06/09	4236	1965
07/07/09	3720	1750
07/08/09	2726	1334
07/09/09	2075	1061
07/10/09	1697	903
07/11/09	3722	1750
07/12/09	3914	1831
07/13/09	5886	2656
07/14/09	6606	2958
07/15/09	8119	3591
07/16/09	7715	3422
07/17/09	7677	3406
07/18/09	3854	1806

YEAR END

**Merck WWTP Influent Sample
COD and BOD Data**

07/19/09	13121	5685
07/20/09	4733	2174
07/21/09	5093	2324
07/22/09	8552	3772
07/23/09	8538	3766
07/24/09	5569	2523
07/25/09	7703	3417
07/26/09	6776	3029
07/27/09	3017	1455
07/28/09	3718	1749
07/29/09	8375	3698
07/30/09	11129	4851
07/31/09	8392	3705
08/01/09	6206	2790
08/02/09	3795	1781
08/03/09	5117	2335
08/04/09	4828	2213
08/05/09	7816	3464
08/06/09	21343	9127
08/07/09	8170	3612
08/08/09	5849	2641
08/09/09	6203	2789
08/10/09	6764	3024
08/11/09	5619	2544
08/12/09	4285	1986
08/13/09	19428	8325
08/14/09	5214	2375
08/15/09	6645	2974
08/16/09	6282	2822
08/17/09	4168	1937
08/18/09	4149	1929
08/19/09	5001	2286
08/20/09	6485	2907
08/21/09	3883	1818
08/22/09	3301	1574
08/23/09	3648	1719
08/24/09	5116	2334
08/25/09	2805	1366
08/26/09	2197	1112
08/27/09	6619	2963
08/28/09	5100	2327
08/29/09	6248	2808
08/30/09	3888	1820
08/31/09	5581	2529
09/01/09	3277	1564
09/02/09	8235	3639
09/03/09	5896	2660
09/04/09	4181	1943
09/05/09	4214	1956
09/06/09	6556	2937
09/07/09	3884	1818
09/08/09	7310	3252

**Merck WWTP Influent Sample
COD and BOD Data**

09/09/09	6223	2797
09/10/09	10492	4584
09/11/09	7184	3200
09/12/09	3381	1608
09/13/09	5748	2598
09/14/09	4348	2013
09/15/09	7046	3142
09/16/09	9013	3965
09/17/09	9429	4139
09/18/09	10220	4470
09/19/09	7277	3238
09/20/09	5164	2354
09/21/09	4615	2124
09/22/09	8517	3757
09/23/09	6266	2815
09/24/09	8857	3900
09/25/09	5347	2431
09/26/09	4691	2156
09/27/09	5394	2450
09/28/09	6323	2839
09/29/09	2577	1271
09/30/09	6072	2734
10/01/09	9168	4030
10/02/09	8151	3605
10/03/09	8371	3697
10/04/09	6884	3074
10/05/09	7442	3308
10/06/09	3223	1542
10/07/09	2380	1189
10/08/09	11673	5079
10/09/09	6004	2706
10/10/09	4270	1980
10/11/09	3780	1775
10/12/09	4604	2120
10/13/09	8432	3722
10/14/09	0	192
10/15/09	4049	1887
10/16/09	5761	2604
10/17/09	5226	2380
10/18/09	6379	2863
10/19/09	5227	2381
10/20/09	4904	2245
10/21/09	11318	4930
10/22/09	6000	2704
10/23/09	4751	2181
10/24/09	5542	2512
10/25/09	9560	4194
10/26/09	7583	3367
10/27/09	5776	2610
10/28/09	5402	2454
10/29/09	7987	3536
10/30/09	10466	4574

**Merck WWTP Influent Sample
COD and BOD Data**

10/31/09	5590	2532
11/01/09	2047	1049
11/02/09	6902	3081
11/03/09	3335	1588
11/04/09	6460	2897
11/05/09	9389	4123
11/06/09	7509	3336
11/07/09	1983	1022
11/08/09	4243	1968
11/09/09	3786	1777
11/10/09	3112	1495
11/11/09	3037	1463
11/12/09	4752	2182
11/13/09	4973	2274
11/14/09	2051	1051
11/15/09	3094	1488
11/16/09	1467	807
11/17/09	5164	2354
11/18/09	4432	2048
11/19/09	9929	4349
11/20/09	12036	5231
11/21/09	10894	4753
11/22/09	5130	2340
11/23/09	12589	5462
11/24/09	7752	3438
11/25/09	7047	3142
11/26/09	4638	2134
11/27/09	9000	3960
11/28/09	5119	2335
11/29/09	2528	1251
11/30/09	3694	1739
12/01/09	3476	1648
12/02/09	6420	2880
12/03/09	5776	2610
12/04/09	8117	3590
12/05/09	5209	2373
12/06/09	2659	1305
12/07/09	8365	3694
12/08/09	10824	4723
12/09/09	6970	3110
12/10/09	2151	1093
12/11/09	3330	1586
12/12/09	3039	1464
12/13/09	1869	975
12/14/09	3581	1691
12/15/09	2153	1093
12/16/09	6079	2737
12/17/09	6511	2918
12/18/09	7981	3533
12/19/09	342	335
12/20/09	4416	2041
12/21/09	9748	4273

**Merck WWTP Influent Sample
COD and BOD Data**

12/22/09	5790	2616
12/23/09	3315	1580
12/24/09	1692	901
12/25/09	3786	1777
12/26/09	6502	2914
12/27/09	8890	3914
12/28/09	7684	3409
12/29/09	12621	5476
12/30/09	12621	5476
12/31/09	8365	3694
01/01/10	5098	2327
01/02/10	7197	3205
01/03/10	5787	2615
01/04/10	4883	2237
01/05/10	3251	1553
01/06/10	4837	2217
01/07/10	10649	4650
01/08/10	10124	4430
01/09/10	0	192
01/10/10	2974	1437
01/11/10	1628	874
01/12/10	7861	3483
01/13/10	11037	4813
01/14/10	7127	3176
01/15/10	7746	3435
01/16/10	3498	1656
01/17/10	10658	4654
01/18/10	12747	5528
01/19/10	4793	2199
01/20/10	5197	2368
01/21/10	5094	2325
01/22/10	4413	2040
01/23/10	10659	4654
01/24/10	10485	4581
01/25/10	9060	3985
01/26/10	15166	6541
01/27/10	8899	3918
01/28/10	10658	4654
01/29/10	14379	6211
01/30/10	7912	3504
01/31/10	5507	2498
02/01/10	8019	3549
02/02/10	8419	3717
02/03/10	2608	1284
02/04/10	6718	3004
02/05/10	9216	4050
02/06/10	5467	2481
02/07/10	5674	2568
02/08/10	4398	2033
02/09/10	3591	1695
02/10/10	3354	1596
02/11/10	7527	3343

**Merck WWTP Influent Sample
COD and BOD Data**

02/12/10	8522	3760
02/13/10	1630	875
02/14/10	2913	1412
02/15/10	2578	1272
02/16/10	3652	1721
02/17/10	2692	1319
02/18/10	7362	3274
02/19/10	13061	5660
02/20/10	5285	2405
02/21/10	6235	2802
02/22/10	10609	4633
02/23/10	11348	4943
02/24/10	12235	5314
02/25/10	5220	2377
02/26/10	4984	2279
02/27/10	6109	2750
02/28/10	6459	2896
03/01/10	4751	2181
03/02/10	666	471
03/03/10	3702	1742
03/04/10	6996	3121
03/05/10	10131	4433
03/06/10	5789	2616
03/07/10	7970	3529
03/08/10	4137	1924
03/09/10	3510	1662
03/10/10	3157	1514
03/11/10	7916	3506
03/12/10	6232	2801
03/13/10	4782	2194
03/14/10	8228	3637
03/15/10	10435	4561
03/16/10	9154	4024
03/17/10	6224	2798
03/18/10	5136	2343
03/19/10	4123	1918
03/20/10	4415	2040
03/21/10	1058	635
03/22/10	5379	2444
03/23/10	7384	3283
03/24/10	5991	2700
03/25/10	4787	2196
03/26/10	2663	1307
03/27/10	1702	905
03/28/10	3577	1690
03/29/10	1303	738
03/30/10	1299	736
03/31/10	6275	2819
04/01/10	1940	1004
04/02/10	3640	1716
04/03/10	0	192
04/04/10	5716	2585

**Merck WWTP Influent Sample
COD and BOD Data**

04/05/10	0	192
04/06/10	4047	1886
04/07/10	0	192
04/08/10	12862	5577
04/09/10	10559	4612
04/10/10	7279	3239
04/11/10	8226	3636
04/12/10	9245	4062
04/13/10	0	192
04/14/10	3948	1845
04/15/10	0	192
04/16/10	4231	1963
04/17/10	1307	739
04/18/10	808	531
04/19/10	2648	1301
04/20/10	1239	711
04/21/10	1775	935
04/22/10	473	390
04/23/10	1123	662
04/24/10	458	384
04/25/10	2196	1112
04/26/10	1682	897
04/27/10	2079	1063
04/28/10	4345	2011
04/29/10	5823	2630
04/30/10	4019	1875
05/01/10	2576	1270
05/02/10	604	445
05/03/10	1044	629
05/04/10	1179	686
05/05/10	1595	860
05/06/10	1929	1000
05/07/10	1551	841
05/08/10	0	192
05/09/10	945	588
05/10/10	1485	814
05/11/10	1615	868
05/12/10	2158	1096
05/13/10	2268	1142
05/14/10	13	198
05/15/10	0	192
05/16/10	4253	1973
05/17/10	2457	1221
05/18/10	931	582
05/19/10	334	332
05/20/10	1706	906
05/21/10	705	487
05/22/10	935	584
05/23/10	1562	846
05/24/10	4575	2107
05/25/10	3566	1685
05/26/10	1952	1010

**Merck WWTP Influent Sample
COD and BOD Data**

05/27/10	4266	1978
05/28/10	4737	2175
05/29/10	2992	1445
05/30/10	2790	1360
05/31/10	1881	980
06/01/10	4240	1967
06/02/10	5077	2318
06/03/10	3646	1718
06/04/10	2371	1185
06/05/10	0	192
06/06/10	0	192
06/07/10	4423	2044
06/08/10	2131	1084
06/09/10	4027	1878
06/10/10	4437	2050
06/11/10	5821	2629
06/12/10	2896	1405
06/13/10	2088	1066
06/14/10	4341	2010
06/15/10	4245	1969
06/16/10	12722	5518
06/17/10	4434	2049
06/18/10	4377	2025
06/19/10	3539	1674
06/20/10	2019	1037
06/21/10	2131	1084
06/22/10	1874	977
06/23/10	2783	1357
06/24/10	6904	3082
06/25/10	5941	2679
06/26/10	3354	1596
06/27/10	5178	2360
06/28/10	3650	1720
06/29/10	6563	2940
06/30/10	2935	1421
07/01/10	4629	2130
07/02/10	5630	2549
07/03/10	7575	3363
07/04/10	3129	1502
07/05/10	751	507
07/06/10	2900	1406
07/07/10	4060	1892
07/08/10	4167	1936
07/09/10	6339	2846
07/10/10	3418	1623
07/11/10	346	337
07/12/10	2271	1143
07/13/10	6478	2904
07/14/10	4101	1909
07/15/10	3540	1674
07/16/10	1931	1001
07/17/10	2156	1095

**Merck WWTP Influent Sample
COD and BOD Data**

07/18/10	0	192
07/19/10	6255	2811
07/20/10	4051	1888
07/21/10	1332	750
07/22/10	2009	1033
07/23/10	1496	819
07/24/10	538	418
07/25/10	1414	784
07/26/10	1593	859
07/27/10	0	192
07/28/10	0	192
07/29/10	6058	2728
07/30/10	0	192
07/31/10	7998	3540
08/01/10	2954	1429
08/02/10	1812	951
08/03/10	3210	1536
08/04/10	2447	1217
08/05/10	4874	2233
08/06/10	3990	1863
08/07/10	5841	2638
08/08/10	4613	2124
08/09/10	10689	4667
08/10/10	2810	1369
08/11/10	3550	1679
08/12/10	3721	1750
08/13/10	2576	1270
08/14/10	2716	1329
08/15/10	13281	5752
08/16/10	5811	2625
08/17/10	3786	1777
08/18/10	602	444
08/19/10	4301	1993
08/20/10	4598	2117
08/21/10	3731	1754
08/22/10	2725	1333
08/23/10	3467	1644
08/24/10	3566	1685
08/25/10	3375	1605
08/26/10	6841	3056
08/27/10	6221	2797
08/28/10	6706	3000
08/29/10	5364	2438
08/30/10	5588	2531
08/31/10	6673	2986
09/01/10	4398	2033
09/02/10	7142	3182
09/03/10	3789	1778
09/04/10	0	192
09/05/10	2880	1398
09/06/10	3551	1679
09/07/10	2151	1093

**Merck WWTP Influent Sample
COD and BOD Data**

09/08/10	4611	2123
09/09/10	4072	1897
09/10/10	6386	2866
09/11/10	3173	1520
09/12/10	4626	2129
09/13/10	3126	1501
09/14/10	4239	1967
09/15/10	6010	2708
09/16/10	1438	795
09/17/10	3603	1701
09/18/10	1529	832
09/19/10	2027	1041
09/20/10	3350	1595
09/21/10	2564	1266
09/22/10	6745	3016
09/23/10	7527	3343
09/24/10	7473	3320
09/25/10	3296	1572
09/26/10	4410	2038
09/27/10	3308	1577
09/28/10	9453	4150
09/29/10	2272	1143
09/30/10	8642	3810
10/01/10	0	192
10/02/10	3460	1641
10/03/10	2952	1428
10/04/10	4710	2164
10/05/10	5302	2412
10/06/10	6176	2778
10/07/10	3397	1615
10/08/10	4907	2246
10/09/10	0	192
10/10/10	8566	3778
10/11/10	8572	3781
10/12/10	8315	3673
10/13/10	3008	1452
10/14/10	9971	4366
10/15/10	8008	3544
10/16/10	8440	3725
10/17/10	1489	816
10/18/10	3222	1541
10/19/10	5474	2484
10/20/10	6412	2877
10/21/10	5678	2569
10/22/10	7993	3538
10/23/10	2432	1211
10/24/10	5140	2344
10/25/10	6624	2965
10/26/10	5836	2635
10/27/10	5362	2437
10/28/10	8686	3829
10/29/10	13355	5783

Merck WWTP Influent Sample
COD and BOD Data

10/30/10	9019	3968
10/31/10	3243	1550
11/01/10	4932	2257
11/02/10	7483	3325
11/03/10	6790	3035
11/04/10	5705	2580
11/05/10	4382	2027
11/06/10	3277	1564
11/07/10	9645	4230
11/08/10	9639	4227
11/09/10	12005	5218
11/10/10	6641	2972
11/11/10	5665	2564
11/12/10	4805	2204
11/13/10	4304	1994
11/14/10	1831	959
11/15/10	5707	2581
11/16/10	5343	2429
11/17/10	4353	2015
11/18/10	6867	3067
11/19/10	8792	3873
11/20/10	5447	2473
11/21/10	6831	3052
11/22/10	6206	2790
11/23/10	9294	4083
11/24/10	5390	2449
11/25/10	6483	2906
11/26/10	9426	4138
11/27/10	8259	3650
11/28/10	2997	1447
11/29/10	5594	2534
11/30/10	4862	2227
12/01/10	10608	4633
12/02/10	8563	3777
12/03/10	5862	2646
12/04/10	5016	2292
12/05/10	6351	2851
12/06/10	9470	4157
12/07/10	5369	2440
12/08/10	8752	3856
12/09/10	8385	3702
12/10/10	3334	1588
12/11/10	3052	1470
12/12/10	6566	2941
12/13/10	4574	2107
12/14/10	2950	1427
12/15/10	4189	1946
12/16/10	4451	2055
12/17/10	3688	1736
12/18/10	8356	3690
12/19/10	3261	1557
12/20/10	3366	1601

**Merck WWTP Influent Sample
COD and BOD Data**

12/21/10	5679	2570
12/22/10	7046	3142
12/23/10	10093	4417
12/24/10	2468	1225
12/25/10	1838	962
12/26/10	5846	2639
12/27/10	2784	1358
12/28/10	3533	1671
12/29/10	6327	2841
12/30/10	9048	3980
12/31/10	5726	2589
01/01/11	3802	1784
01/02/11	6247	2807
01/03/11	6378	2862
01/04/11	3065	1476
01/05/11	2964	1433
01/06/11	2829	1377
01/07/11	2686	1317
01/08/11	5381	2445
01/09/11	3634	1713
01/10/11	6336	2845
01/11/11	8444	3727
01/12/11	9364	4112
01/13/11	6879	3072
01/14/11	4353	2015
01/15/11	3519	1665
01/16/11	4280	1984
01/17/11	6511	2918
01/18/11	5620	2545
01/19/11	13877	6001
01/20/11	7355	3271
01/21/11	2664	1308
01/22/11	4927	2255
01/23/11	5430	2465
01/24/11	4744	2178
01/25/11	4970	2273
01/26/11	5796	2619
01/27/11	5656	2560
01/28/11	3509	1661
01/29/11	7099	3164
01/30/11	3740	1758
01/31/11	7144	3183
02/01/11	8203	3626
02/02/11	6577	2946
02/03/11	5292	2407
02/04/11	4203	1952
02/05/11	3488	1652
02/06/11	5391	2449
02/07/11	5189	2365
02/08/11	5310	2415
02/09/11	3170	1519
02/10/11	2623	1290

**Merck WWTP Influent Sample
COD and BOD Data**

02/11/11	2670	1310
02/12/11	3265	1559
02/13/11	7792	3454
02/14/11	6446	2891
02/15/11	7007	3126
02/16/11	7740	3432
02/17/11	5574	2526
02/18/11	6050	2725
02/19/11	2296	1154
02/20/11	7646	3393
02/21/11	6463	2898
02/22/11	5013	2291
02/23/11	5975	2693
02/24/11	6766	3025
02/25/11	3365	1601
02/26/11	3622	1709
02/27/11	3478	1648
02/28/11	3833	1797
03/01/11	4951	2265
03/02/11	4762	2186
03/03/11	5722	2587
03/04/11	5941	2679
03/05/11	7072	3153
03/06/11	8125	3593
03/07/11	8302	3667
03/08/11	700	485
03/09/11	5526	2506
03/10/11	6824	3049
03/11/11	4353	2015
03/12/11	2166	1099
03/13/11	3736	1756
03/14/11	3997	1866
03/15/11	260	301
03/16/11	6464	2898
03/17/11	4306	1995
03/18/11	11603	5050
03/19/11	10102	4421
03/20/11	13321	5769
03/21/11	7179	3198
03/22/11	7225	3217
03/23/11	3890	1821
03/24/11	5641	2554
03/25/11	2767	1350
03/26/11	2763	1349
03/27/11	4087	1903
03/28/11	8371	3697
03/29/11	7321	3257
03/30/11	5720	2587
03/31/11	5828	2632
04/01/11	1741	921
04/02/11	1579	853
04/03/11	3853	1805

**Merck WWTP Influent Sample
COD and BOD Data**

04/04/11	4213	1956
04/05/11	4926	2254
04/06/11	6384	2865
04/07/11	8329	3679
04/08/11	10765	4699
04/09/11	2499	1239
04/10/11	6674	2986
04/11/11	4453	2056
04/12/11	6887	3075
04/13/11	1604	864
04/14/11	2500	1239
04/15/11	5492	2491
04/16/11	9020	3968
04/17/11	8125	3594
04/18/11	4054	1889
04/19/11	5021	2294
04/20/11	4976	2275
04/21/11	4589	2113
04/22/11	5815	2627
04/23/11	6349	2850
04/24/11	8929	3930
04/25/11	6243	2806
04/26/11	3181	1524
04/27/11	3096	1488
04/28/11	3040	1465
04/29/11	5511	2499
04/30/11	3009	1452
05/01/11	6268	2816
05/02/11	5075	2317
05/03/11	2679	1314
05/04/11	8146	3602
05/05/11	8028	3553
05/06/11	3608	1703
05/07/11	2664	1308
05/08/11	2653	1303
05/09/11	2861	1390
05/10/11	3549	1678
05/11/11	3647	1719
05/12/11	5118	2335
05/13/11	4916	2250
05/14/11	2285	1149
05/15/11	3185	1526
05/16/11	1682	896
05/17/11	3005	1450
05/18/11	3016	1455
05/19/11	1931	1001
05/20/11	1483	813
05/21/11	1112	658
05/22/11	3065	1475
05/23/11	3684	1734
05/24/11	2771	1352
05/25/11	2706	1325

**Merck WWTP Influent Sample
COD and BOD Data**

05/26/11	1488	815
05/27/11	1422	787
05/28/11	1151	674
05/29/11	2655	1304
05/30/11	1120	661